



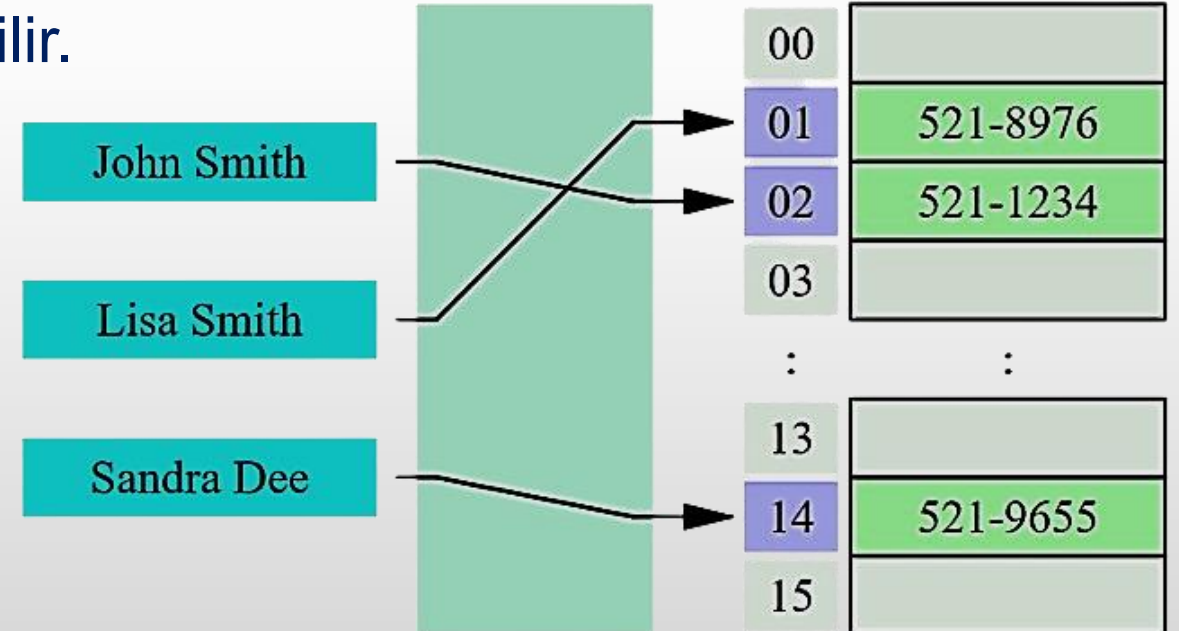
Bölüm 9: Hash Tablosu

Veri Yapıları



Eşleme (Map)

- Anahtar-değer çifti şeklinde ilişkilendirilen veri öğelerini saklar.
- Anahtarlar, her öğeyi benzersiz ve tekil bir şekilde tanımlar.
- İşlemler $O(1)$ zaman karmaşıklığında gerçekleşir.
- Değerler bu anahtarlar ile ilişkilendirilir.





Temel İşlevler

- **Ekleme (Insertion):** Bir anahtar-değer çiftini tabloya ekler.
- **Arama (Search):** Verilen anahtara sahip öğenin değerini döndürür.
- **Silme (Deletion):** Verilen anahtara sahip öğeyi tablodan çıkarır.
- **Güncelleme (Update):** Verilen anahtara sahip öğeyi günceller.



Hash Tablosu

- Öğeleri anahtar değerlerine göre saklar.
- Öğelere hızlı bir şekilde erişmek mümkündür.
- Eşleme (map) arayüzünü uygular.
- Anahtarlar, her öğeyi tekil (unique) bir şekilde tanımlar.
- Yüzde 70'i dolduğunda tablo büyütülmelidir.
- Yeniden boyutlandırma (resizing) çok, çok pahalıdır!
- Tablo boyutu değiştiğinde, tüm değerlerin tekrar hesaplanması gerekir!



Hash Fonksiyonları

- Hash tablosunun temelinde hash fonksiyonu yer alır.
- Öğenin anahtarını girdi olarak alır ve bir sayı (indeks) üretir.
- İndeks, öğenin tablodaki konumunu belirtir.
- Eğer her öğe aynı yuvaya hashlenirse, hash tablo bağlı listeye benzer!
- Hash fonksiyonu iyi bir dağılım sağlamalıdır.
- Hesaplaması hızlı bir hash fonksiyonu bulmak kolay değildir!
- Kapasite seçimi önemlidir,
 - Büyük kapasite, belleği israf eder.
 - Küçük kapasite, çakışmaları arttırır.



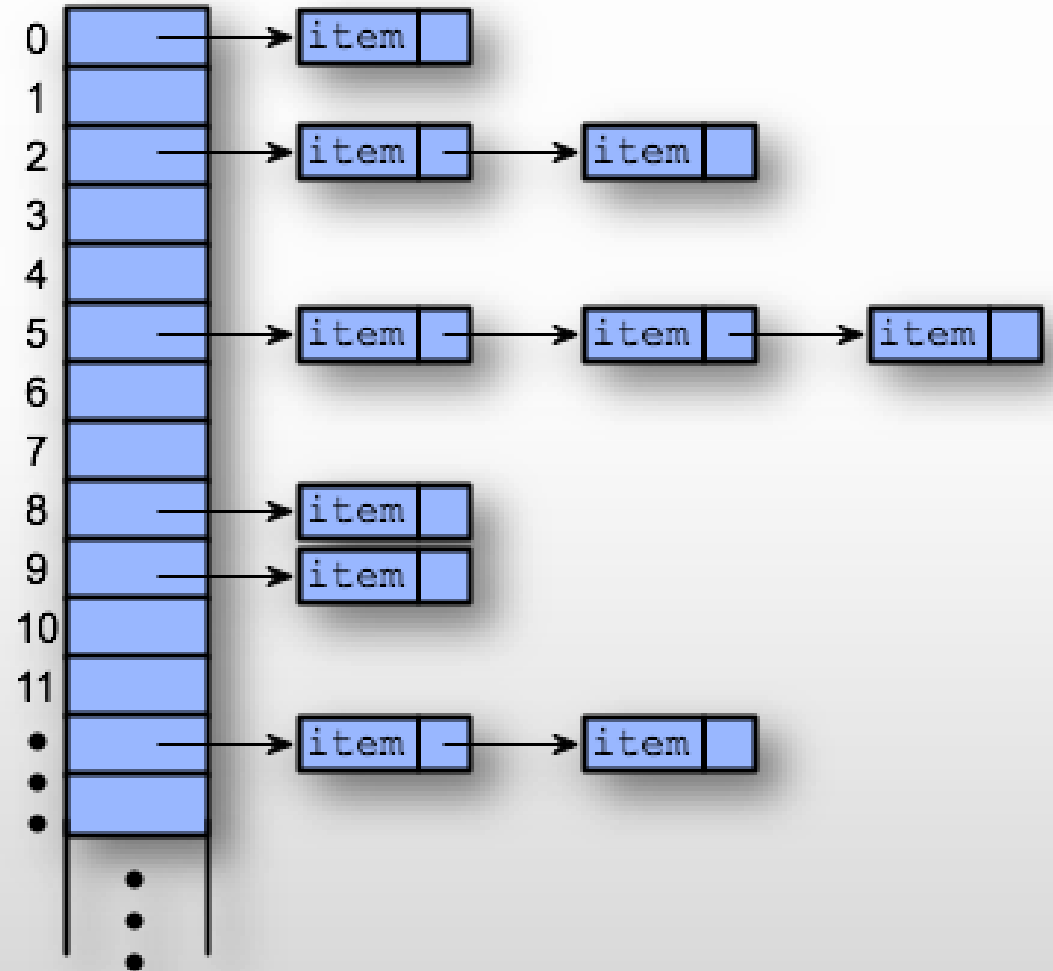
Çakışmalar (Collisions)

- Farklı anahtarlarla aynı indeks değerleri üretildiğinde ortaya çıkar.
- Farklı öğeler aynı konumda saklanamazlar.
- Çarpışmalar kaçınılmaz, bu nedenle çözüm stratejisi belirlemek kritiktir.
- Çakışmaları çözmek için:
 - Zincirleme yöntemi
 - Açık adresleme yöntemi
- Hash tablosu işlemleri $O(1)$ zaman karmaşıklığına sahiptir.
- Ancak, hash fonksiyonu performansı (çakışma oranı) önemlidir.



Kullanım Alanları

- Sözlük
- Veritabanı
- Bellek önbelleği
- Web tarayıcı geçmişi
- Çerez yönetimi





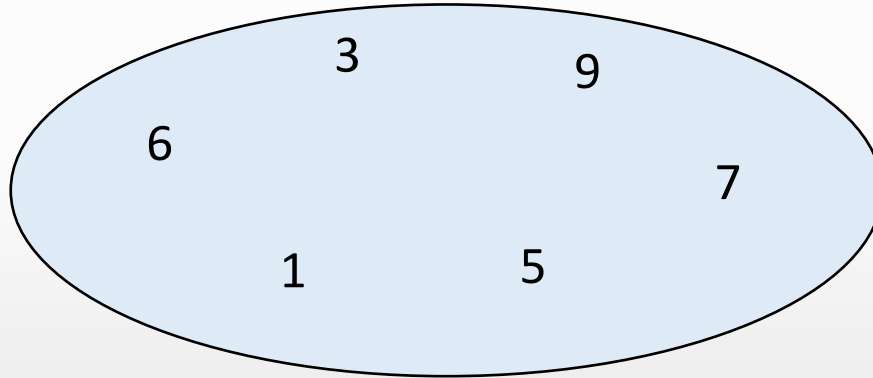
Dizi Üzerinde Arama İşlemi

- Dizide arama işleminin zaman karmaşıklığı $O(1)$ yapılabilir mi?
 - Öğeleri birbiriyle karşılaştırarak zor!
 - Aranılan öğenin konumunu bilmek gerekir.
-
- `int[] sıralıDizi = {1, 3, 5, 7, 9};`
 - `int aranacakIndeks = 2; // Erişilmek istenin öğenin indeksi`
 - `int öge = sıralıDizi[aranacakIndeks]; // $O(1)$ işlem`



İndeksleme

Anahtar Uzayı



Arama:

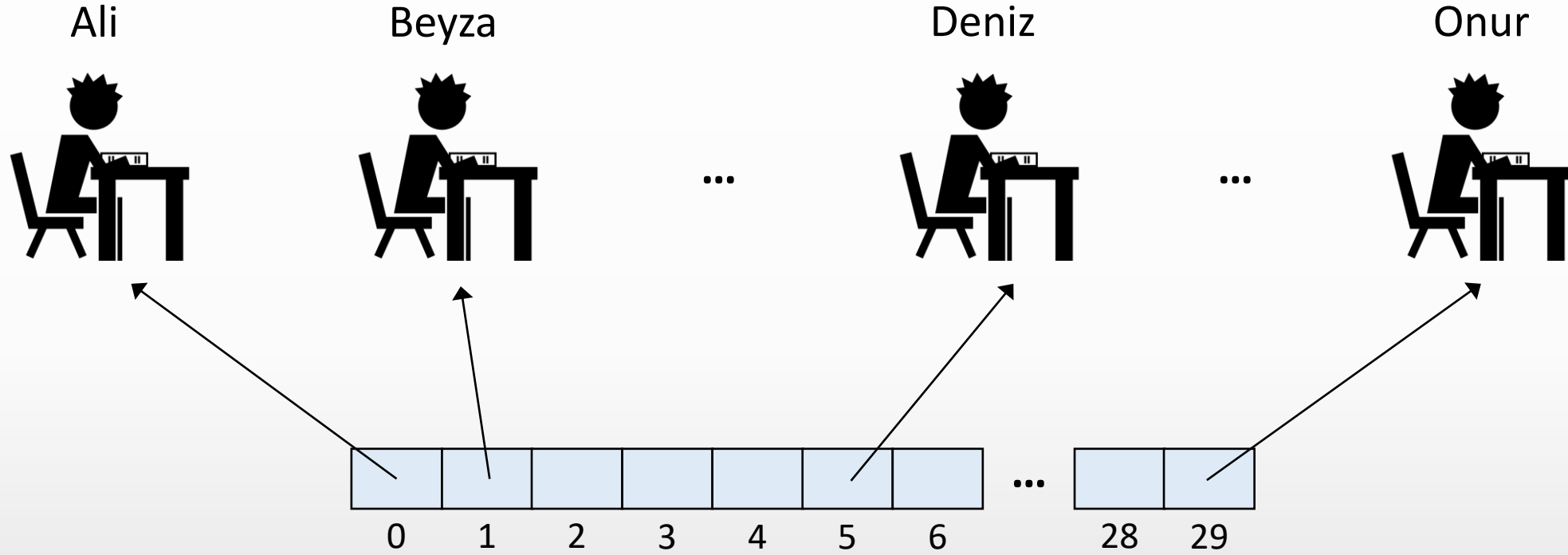
3 bulundu

0 bulunamadı

	1		3		5	6	7		9
0	1	2	3	4	5	6	7	8	9



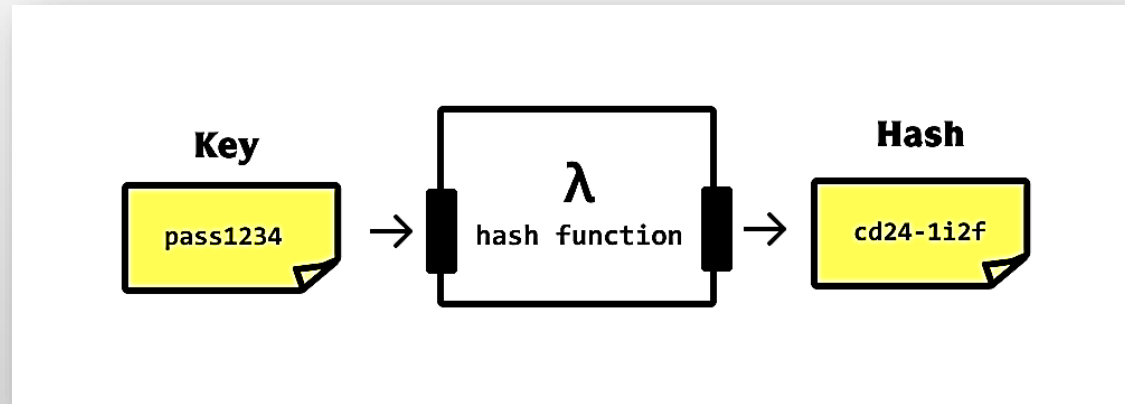
Doğrudan Adresleme





Hash Tekniđi

- Öđe saklama ve erişim amacıyla kullanılan bir tekniktir.
- Öđe için hızlı bir şekilde konum (kova, bucket) bulmak için kullanılır.
- Konum belli ise dizide öđe ekleme, çıkarma, güncelleme kolaydır.
- Hash Tekniđi, bir "hash fonksiyonu" kullanır.
- Hash fonksiyonu, aldığı parametreyi sayısal bir değere dönüştürür.





Örnek Hash Fonksiyonları

▪ Modulus:

- Bir tam sayıyı belirli bir sabit sayıya bölüp kalanı döndürür.
- Dizi indeksleri hesaplarırken kullanışlıdır.

```
int modulusHash(int anahtar, int diziBoyuu) {  
    return anahtar % diziBoyuu;  
}
```



Örnek Hash Fonksiyonları

- **DJB2 Hash:** Basit bir karakter dizisi (string) hash fonksiyonudur.

```
int djb2Hash(String anahtar) {  
    int hash = 5381;  
    for (int i = 0; i < anahtar.length(); i++) {  
        hash = (hash * 33) ^ anahtar.charAt(i);  
    }  
    return hash;  
}
```



Örnek Hash Fonksiyonları

- **CRC32 Hash:** Dairesel düzeltme kodu (CRC) hesaplaması için kullanılır.

```
long crc32Hash(String anahtar) {  
    CRC32 crc = new CRC32();  
    crc.update(anahtar.getBytes());  
    return crc.getValue();  
}
```

Modulus Hash Fonksiyonu

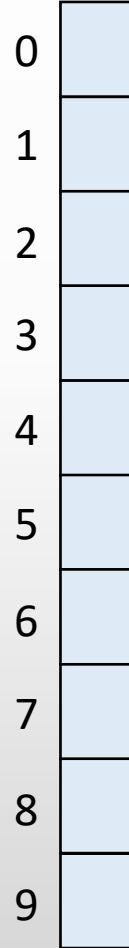
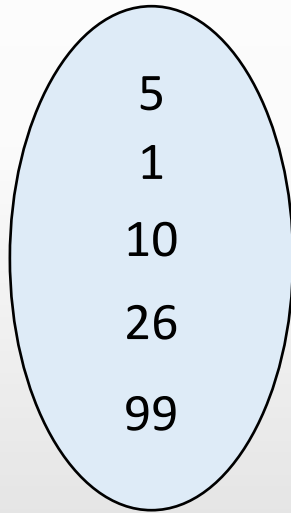




$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı

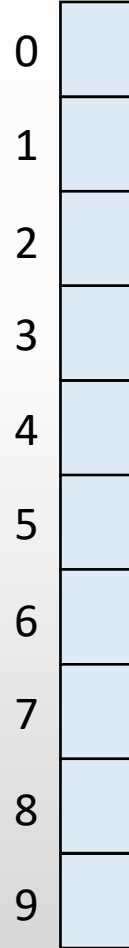
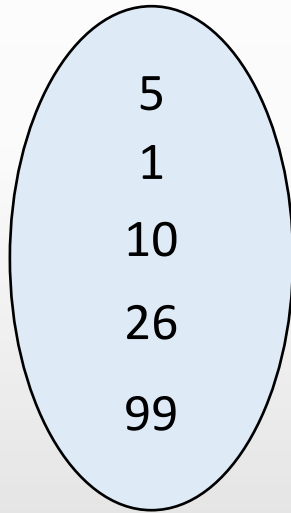




$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı



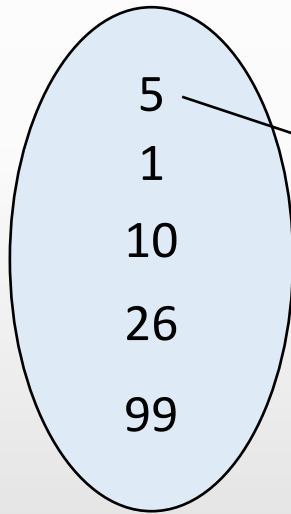
$$5 \% 10 = 5$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı



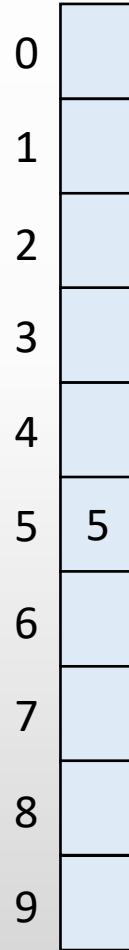
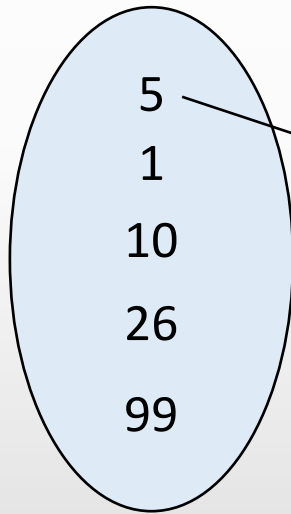
$$5 \% 10 = 5$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı

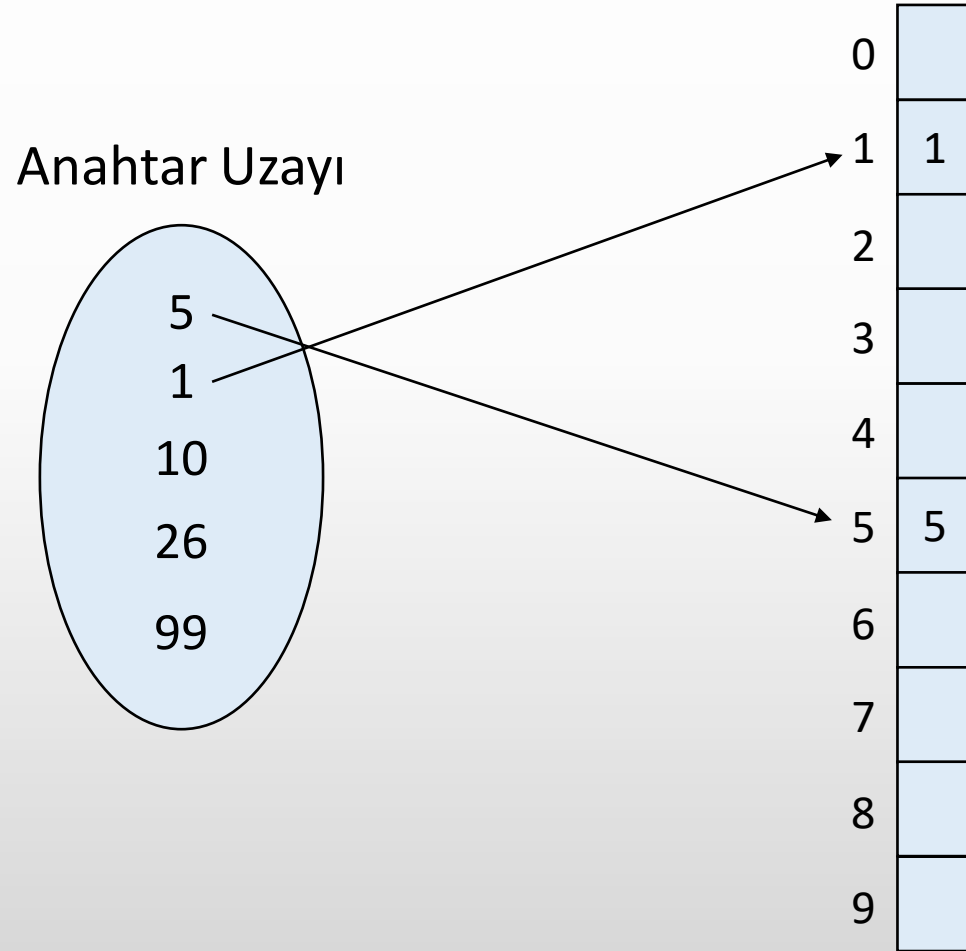


$$5 \% 10 = 5$$

$$1 \% 10 = 1$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$
 $\text{uzunluk} = 10$

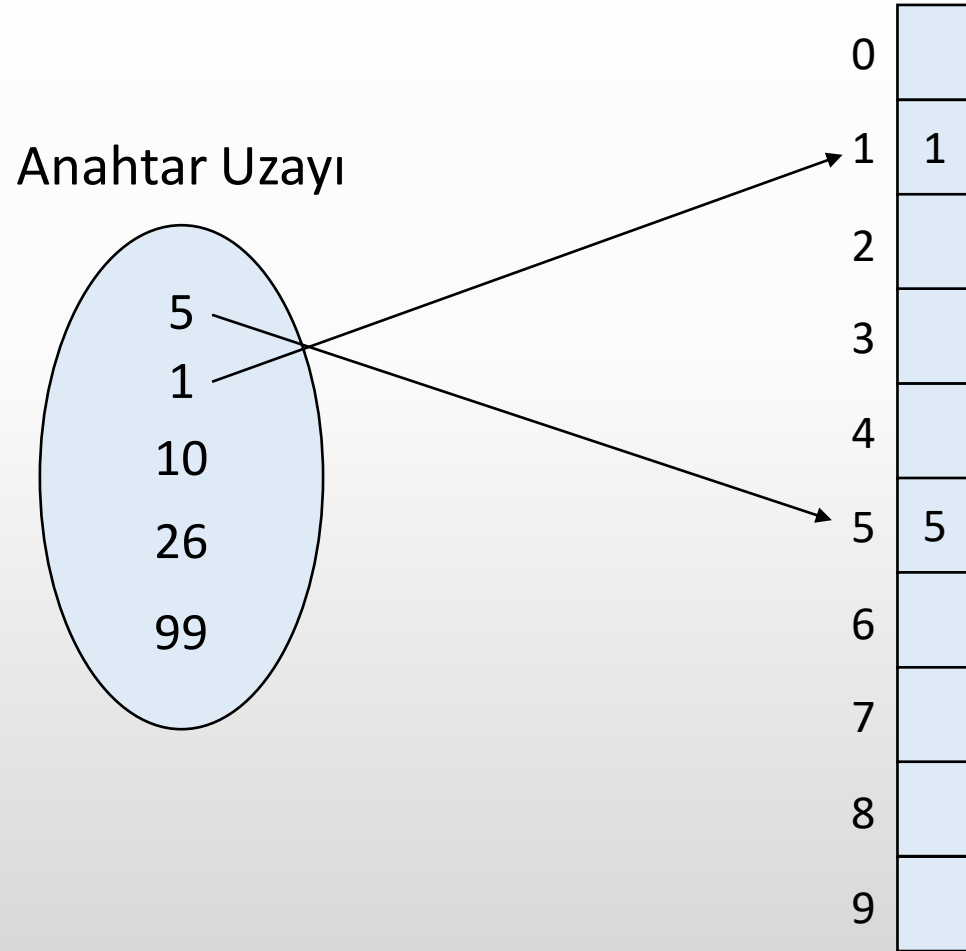


$$5 \% 10 = 5$$

$$1 \% 10 = 1$$



indeks = $h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$
uzunluk = 10



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

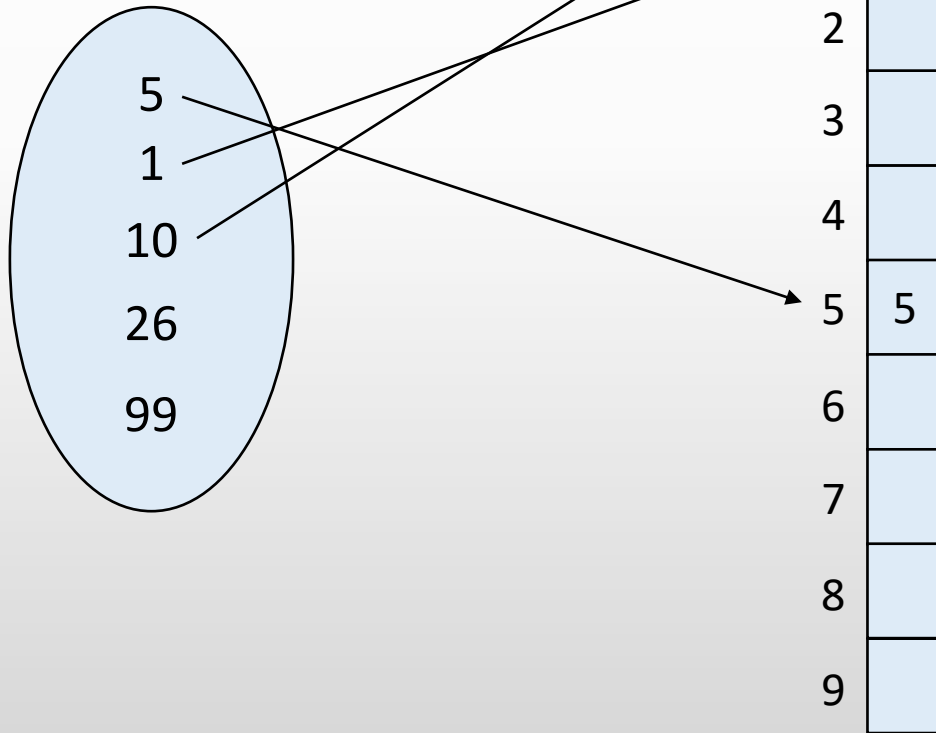
$$10 \% 10 = 0$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı



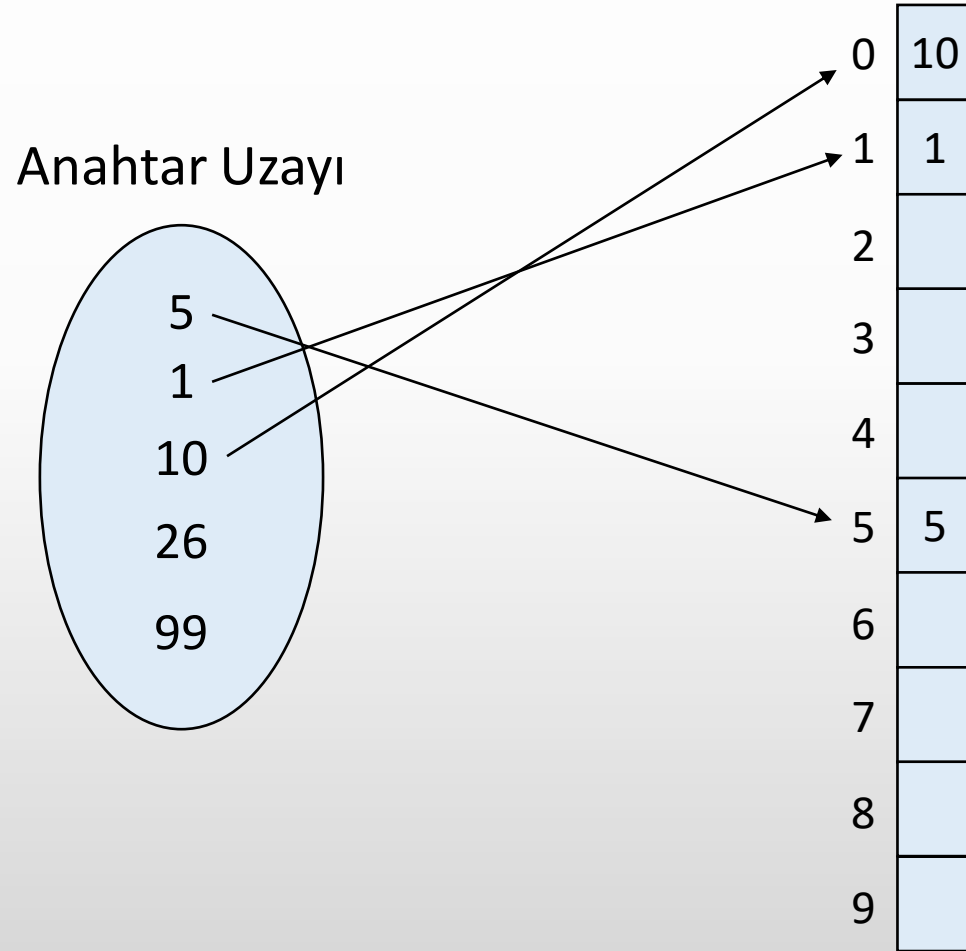
$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$



indeks = $h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$
uzunluk = 10



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

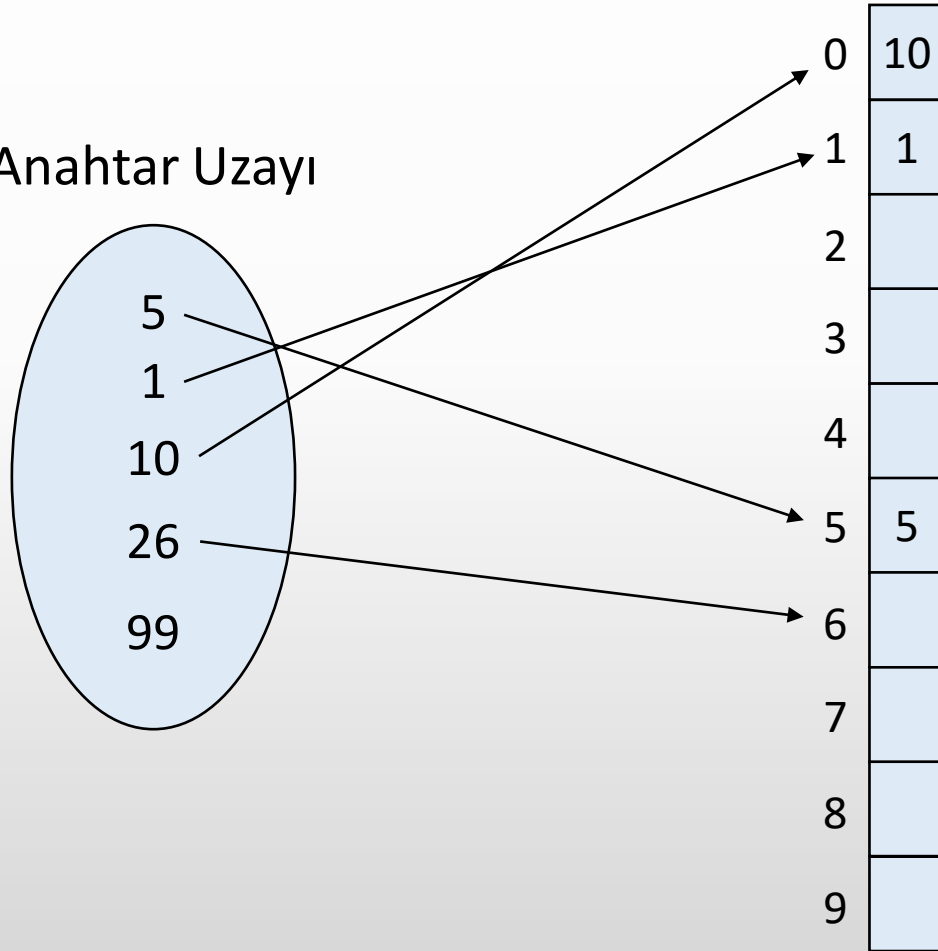
$$26 \% 10 = 6$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

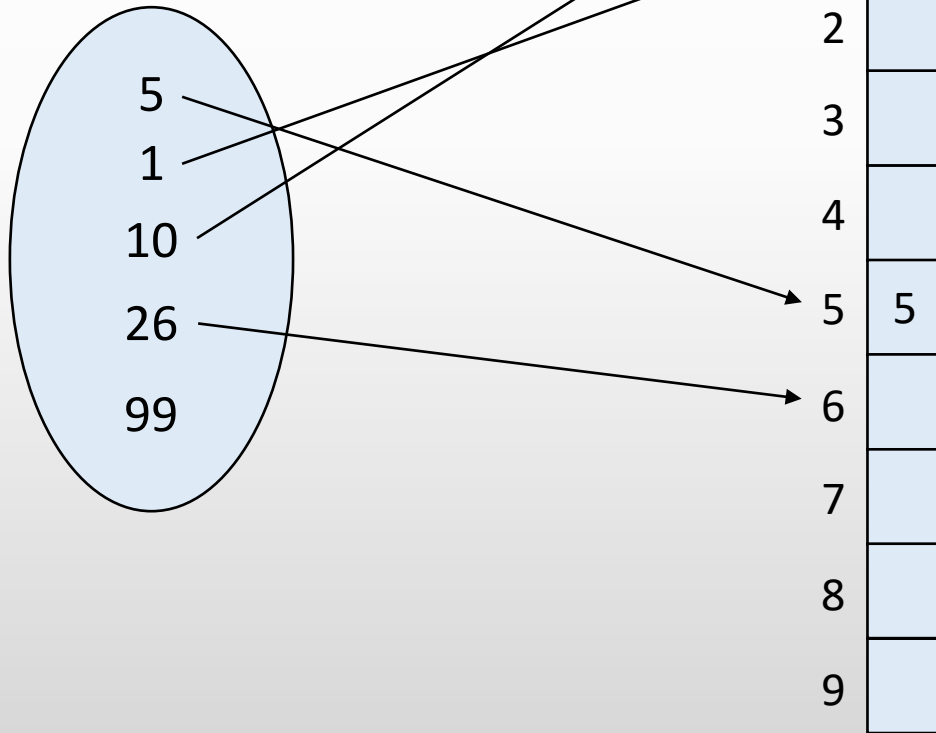
$$26 \% 10 = 6$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

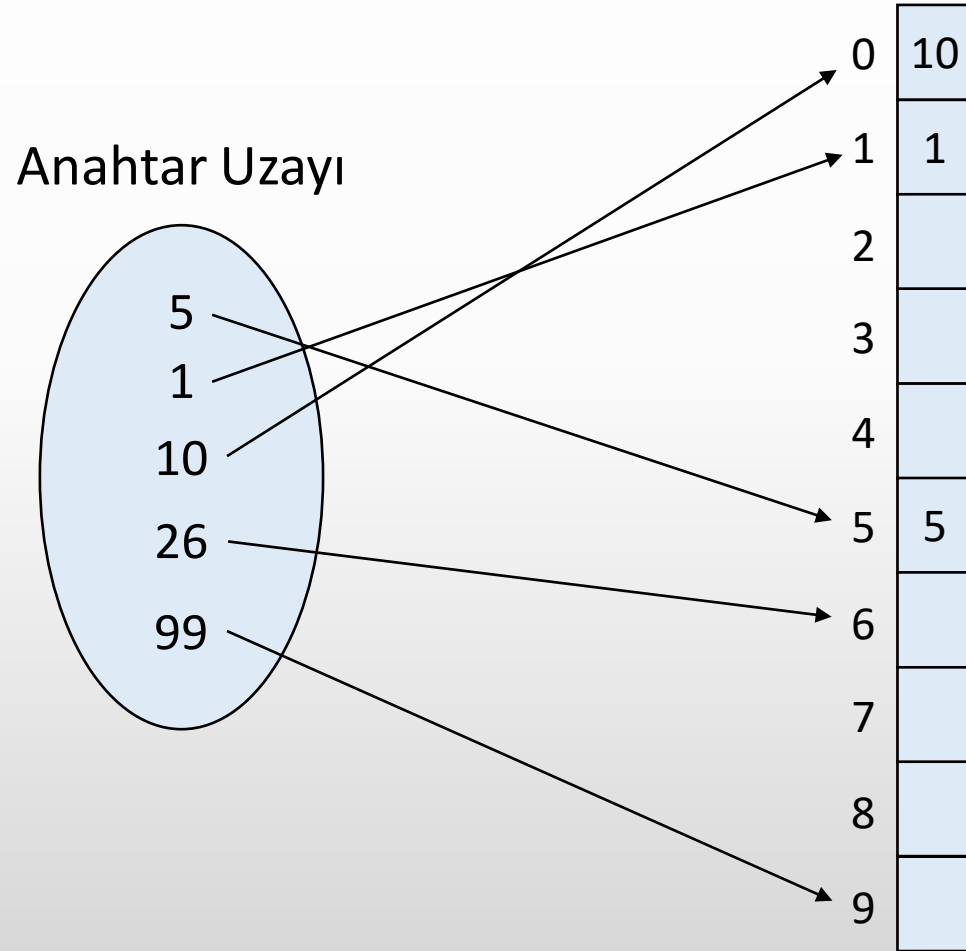
$$10 \% 10 = 0$$

$$26 \% 10 = 6$$

$$99 \% 10 = 9$$



indeks = $h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$
uzunluk = 10



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

$$26 \% 10 = 6$$

$$99 \% 10 = 9$$

Basit Bir Hash Tablosu

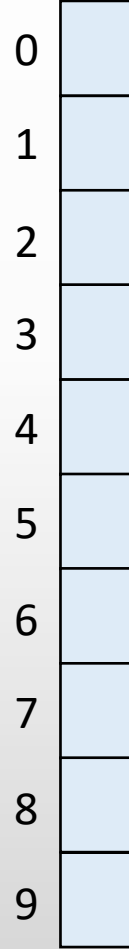




$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı

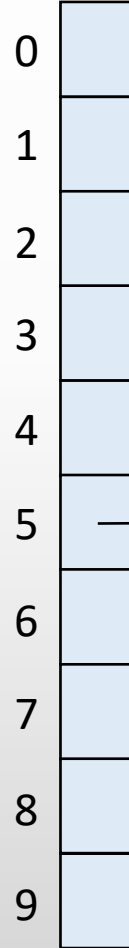




$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



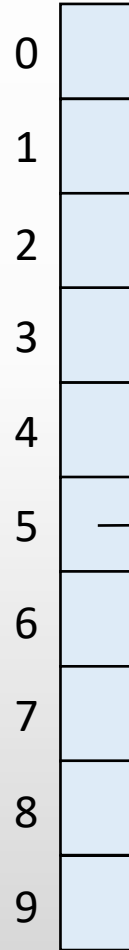
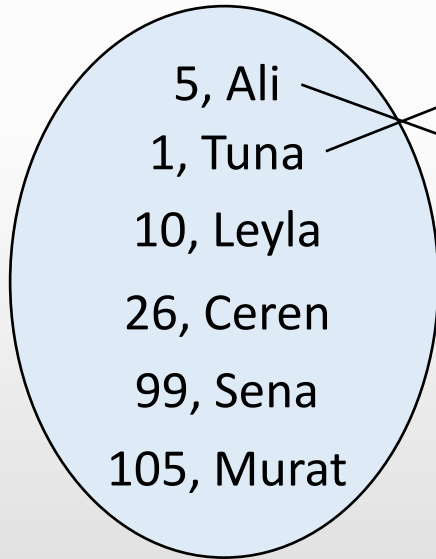
$$5 \% 10 = 5$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

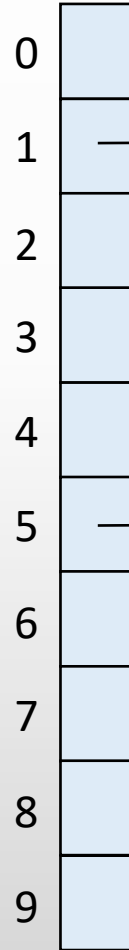
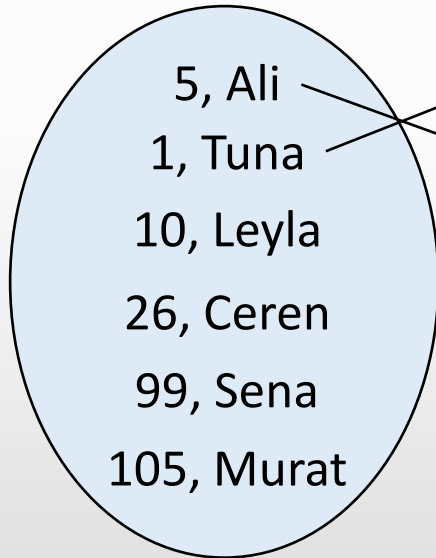
$$1 \% 10 = 1$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

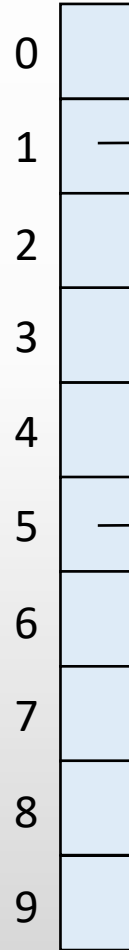
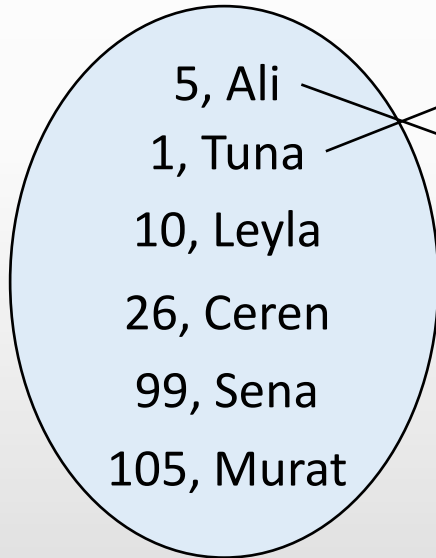
$$1 \% 10 = 1$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

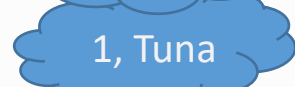
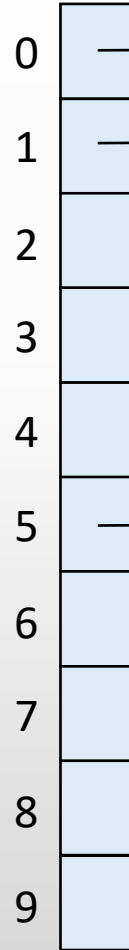
$$10 \% 10 = 0$$



indeks = $h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

uzunluk = 10

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

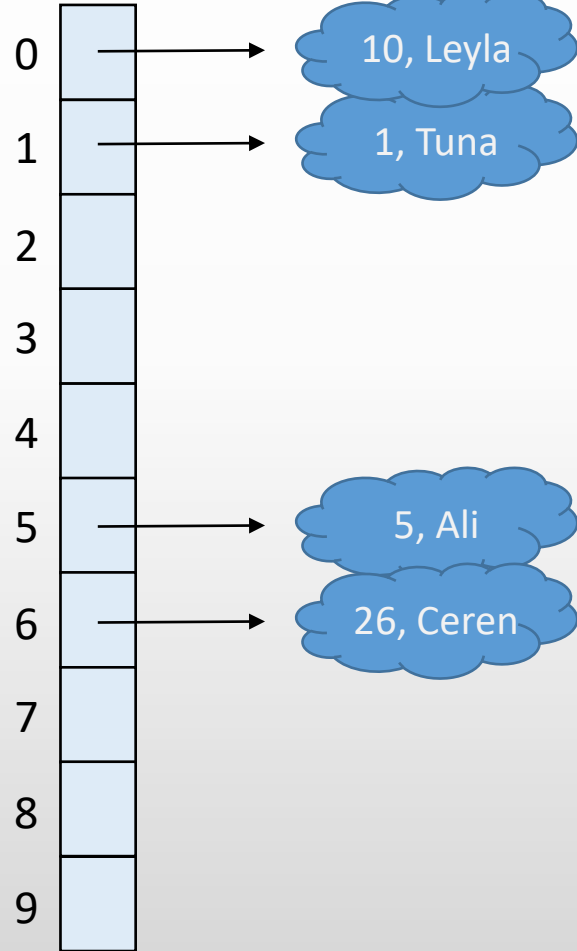
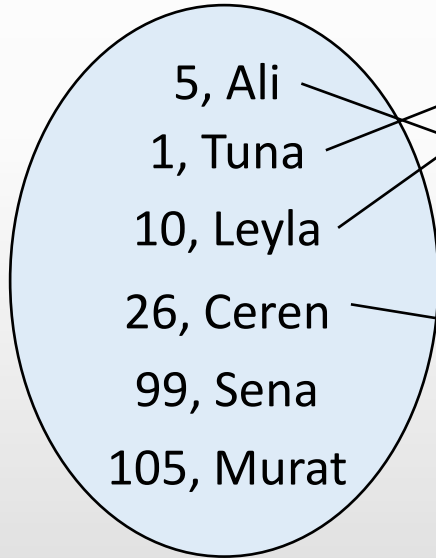
$$10 \% 10 = 0$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

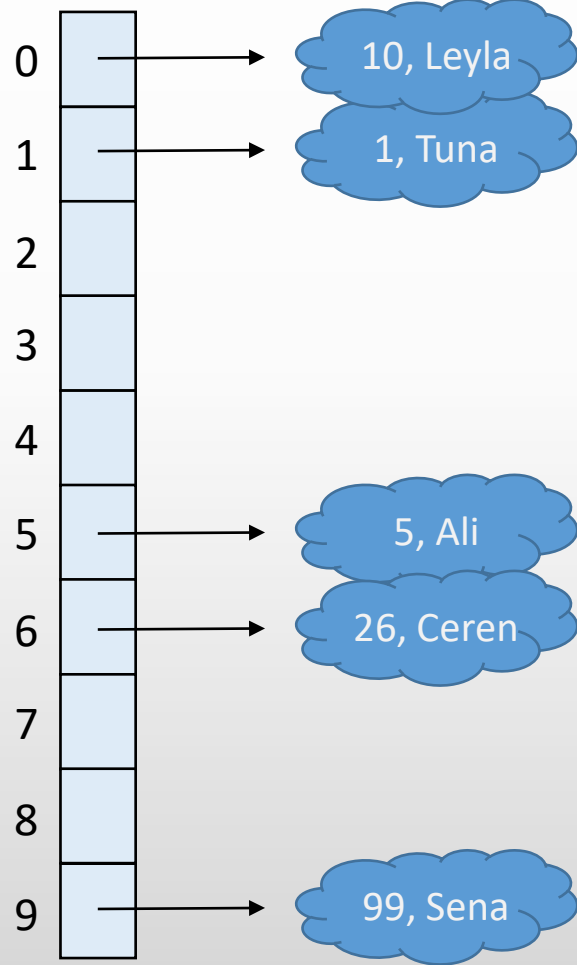
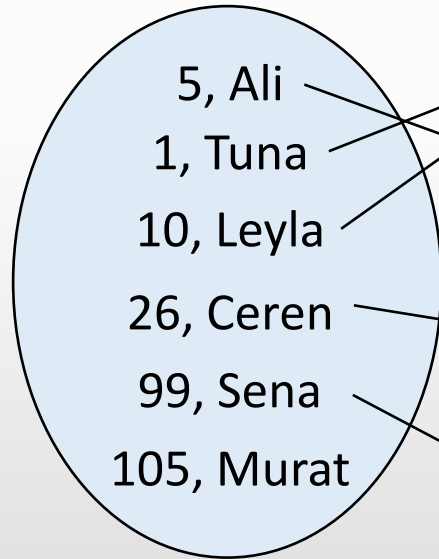
$$26 \% 10 = 6$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

$$26 \% 10 = 6$$

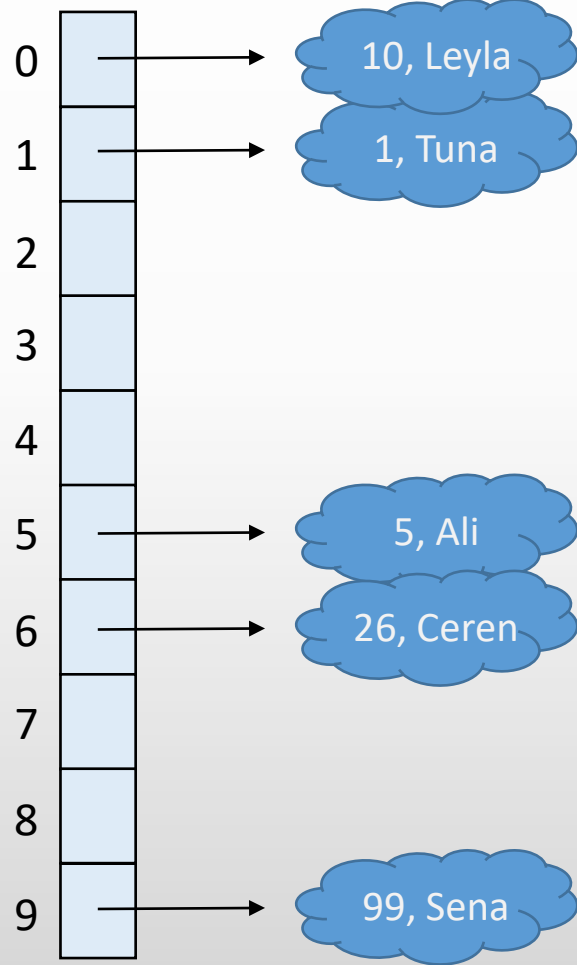
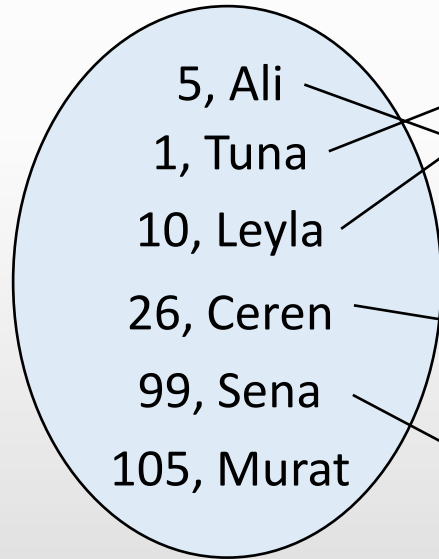
$$99 \% 10 = 9$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

$$26 \% 10 = 6$$

$$99 \% 10 = 9$$

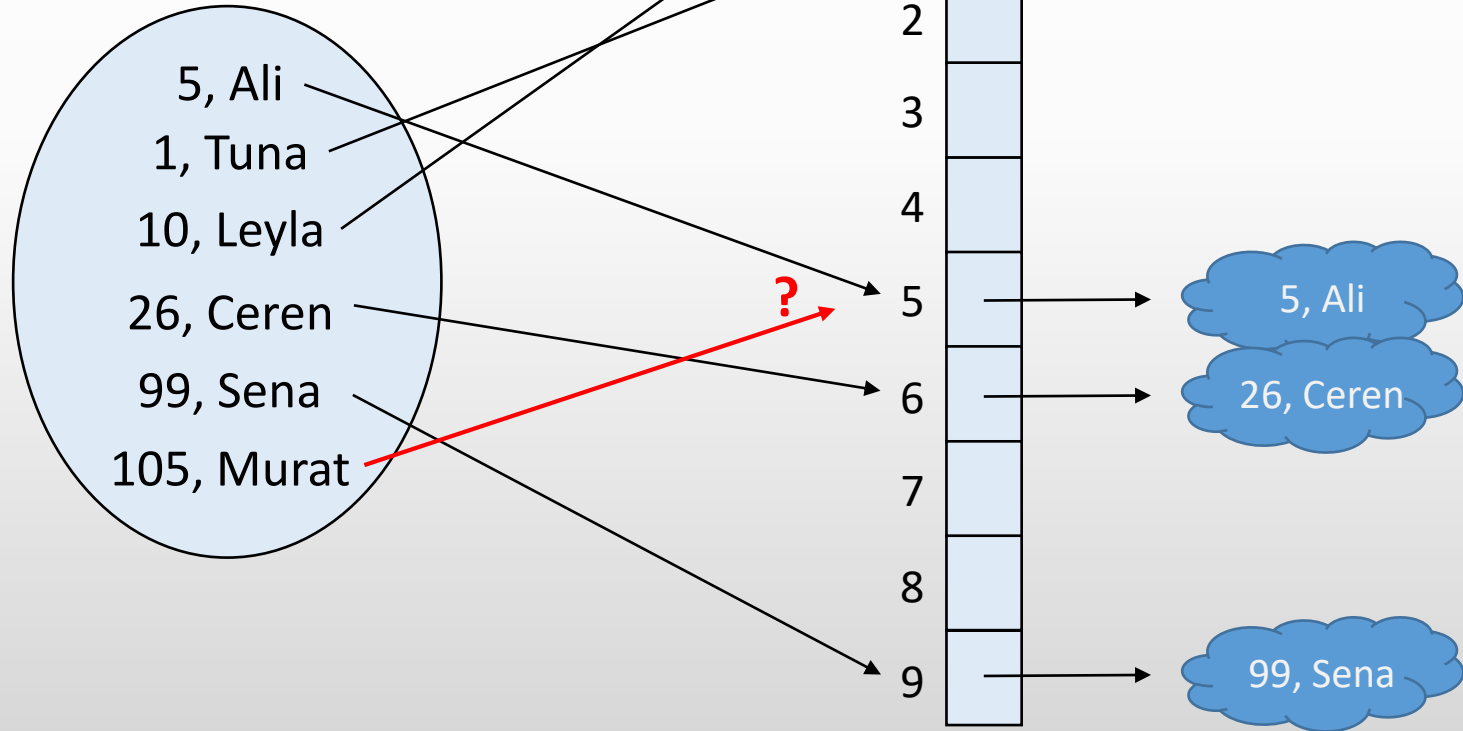
$$105 \% 10 = 5$$



$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

$$10 \% 10 = 0$$

$$26 \% 10 = 6$$

$$99 \% 10 = 9$$

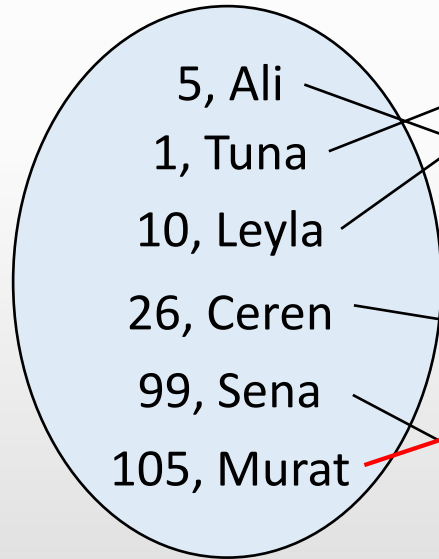
$$105 \% 10 = 5$$



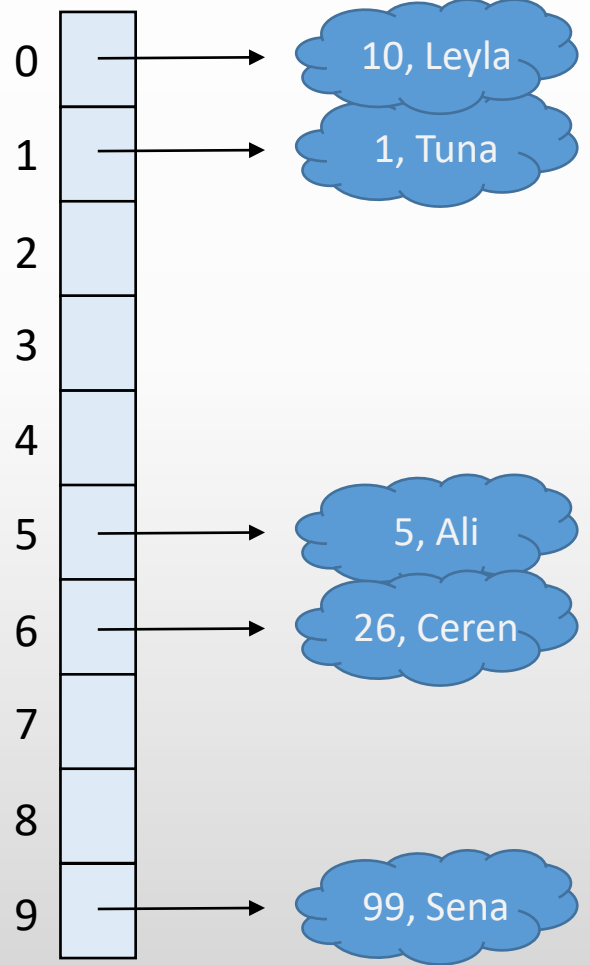
$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

Anahtar - Değer Uzayı



Çakışma ?



- $5 \% 10 = 5$
- $1 \% 10 = 1$
- $10 \% 10 = 0$
- $26 \% 10 = 6$
- $99 \% 10 = 9$
- $105 \% 10 = 5$



Çakışma Çözüm: Ayrı Zincirleme



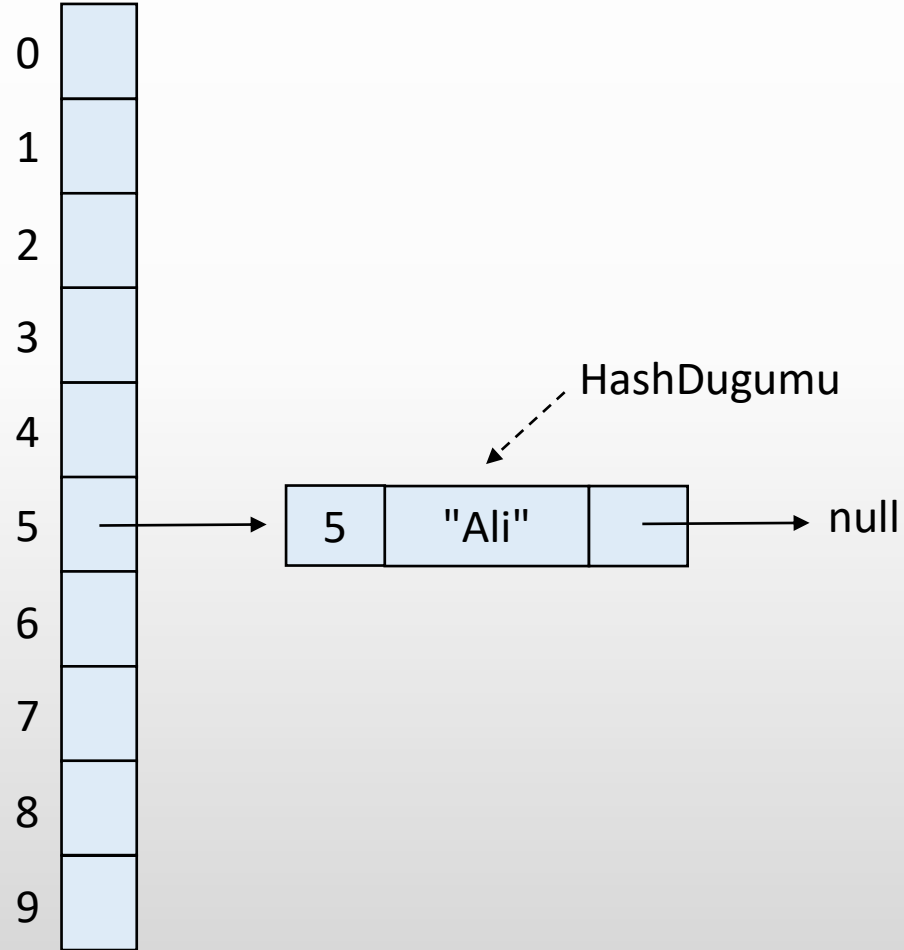
$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

$5 \% 10 = 5$

Anahtar - Değer Uzayı

- 5, Ali
- 1, Tuna
- 10, Leyla
- 26, Ceren
- 99, Sena
- 105, Murat





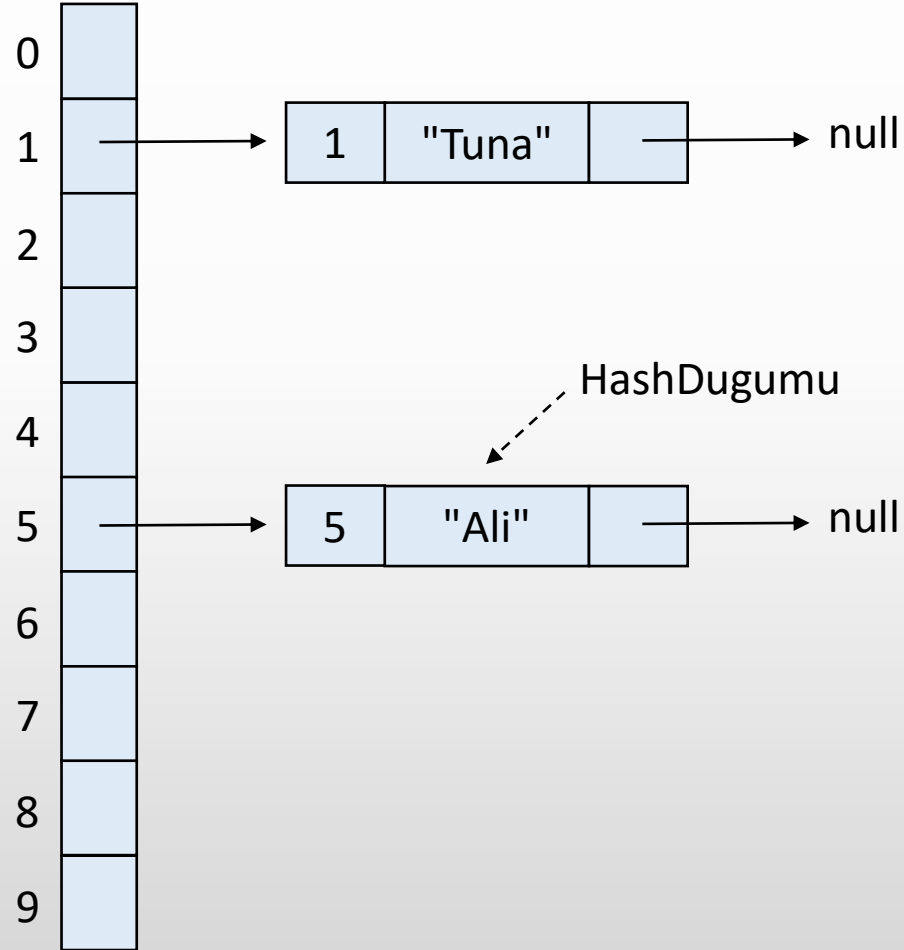
$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

$$5 \% 10 = 5$$

$$1 \% 10 = 1$$

Anahtar - Değer Uzayı





$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

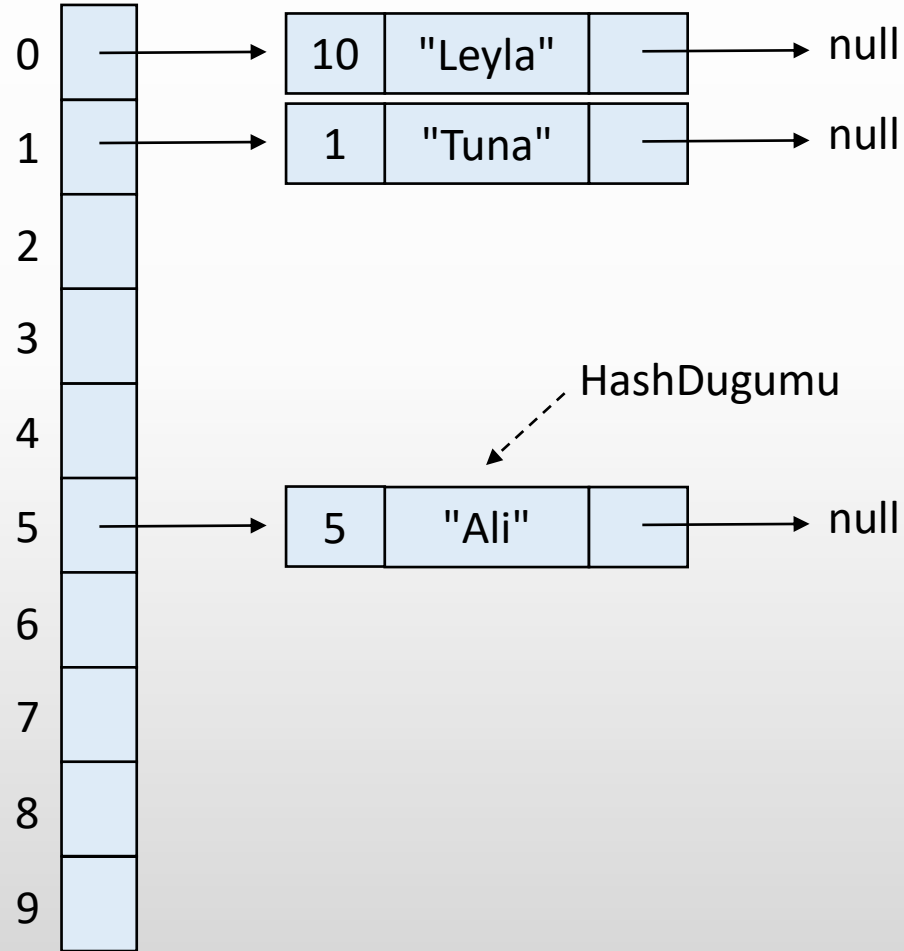
$5 \% 10 = 5$

$1 \% 10 = 1$

$10 \% 10 = 0$

Anahtar - Değer Uzayı

- 5, Ali
- 1, Tuna
- 10, Leyla
- 26, Ceren
- 99, Sena
- 105, Murat





$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

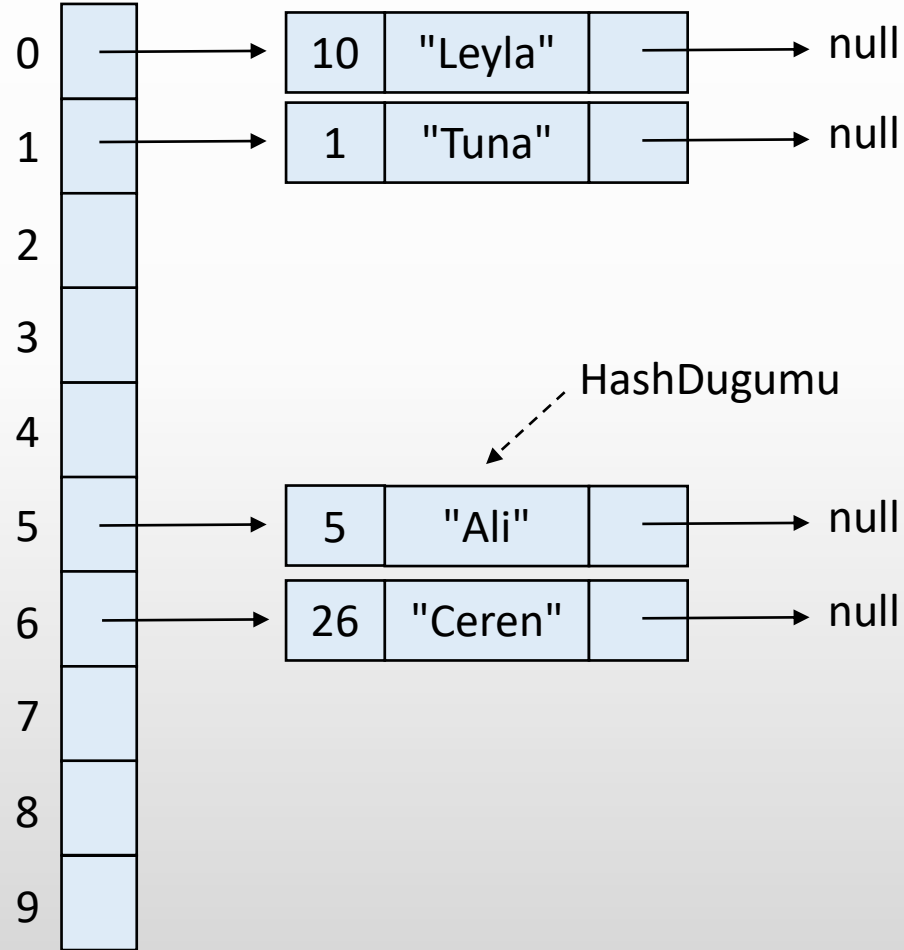
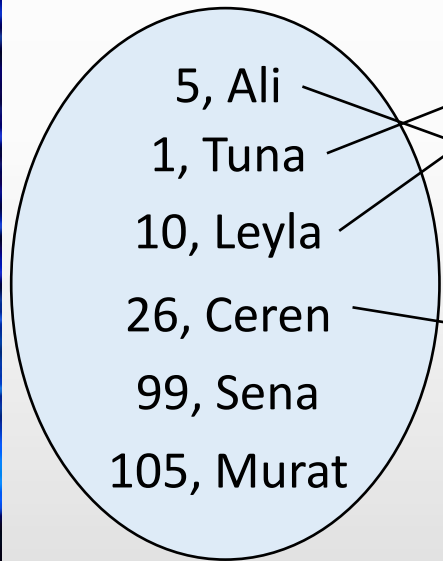
$5 \% 10 = 5$

$1 \% 10 = 1$

$10 \% 10 = 0$

$26 \% 10 = 6$

Anahtar - Değer Uzayı





$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

$5 \% 10 = 5$

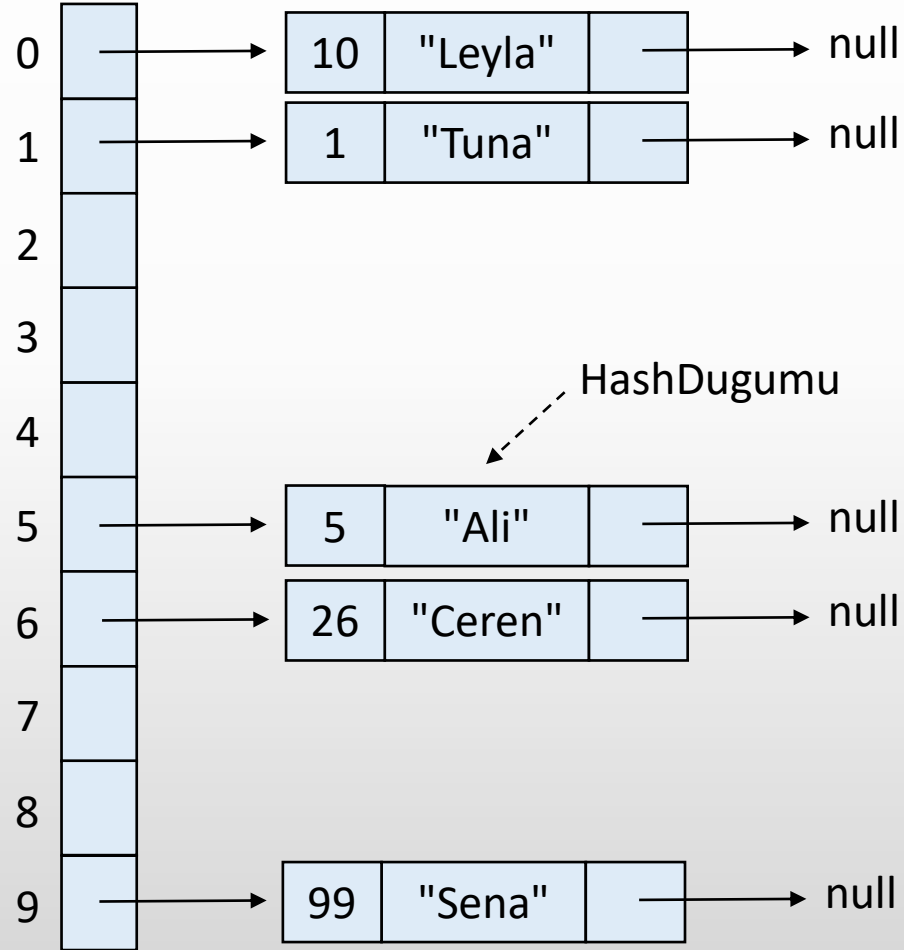
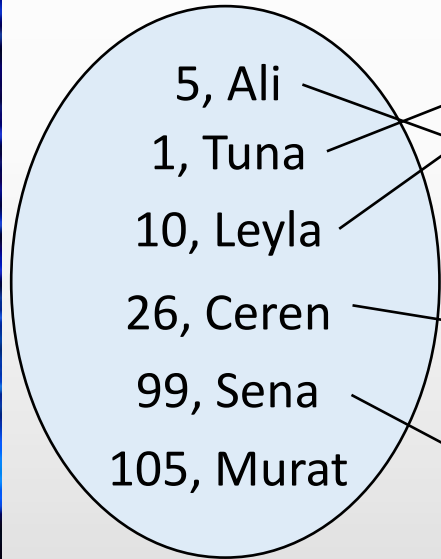
$1 \% 10 = 1$

$10 \% 10 = 0$

$26 \% 10 = 6$

$99 \% 10 = 9$

Anahtar - Değer Uzayı



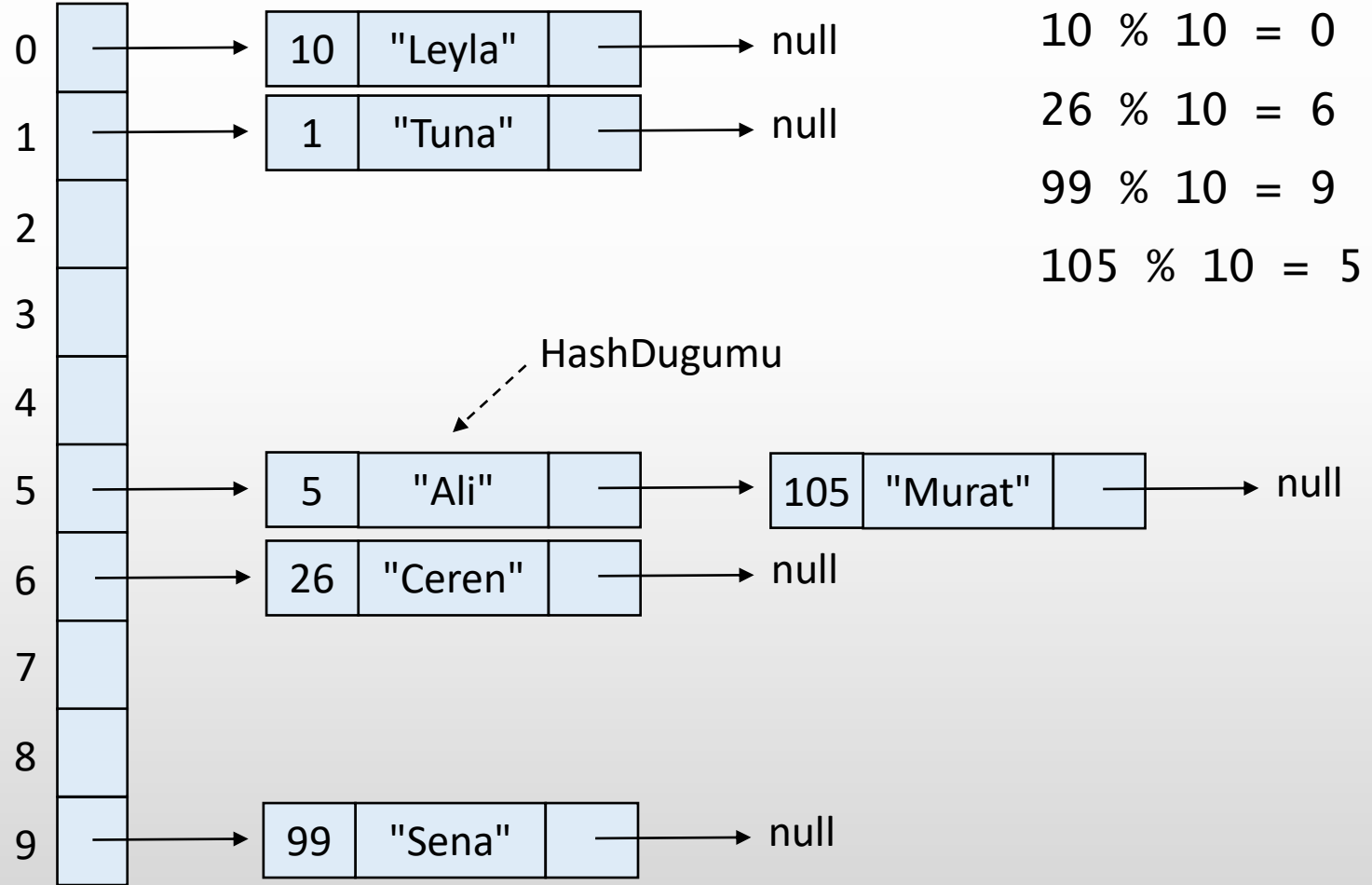
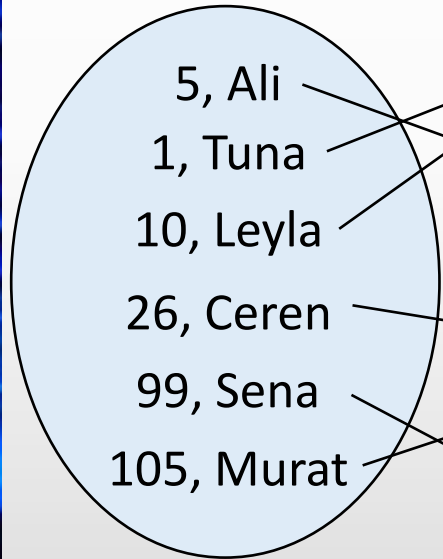


$\text{indeks} = h(\text{anahtar}) = \text{anahtar} \% \text{uzunluk}$

$\text{uzunluk} = 10$

$5 \% 10 = 5$
 $1 \% 10 = 1$
 $10 \% 10 = 0$
 $26 \% 10 = 6$
 $99 \% 10 = 9$
 $105 \% 10 = 5$

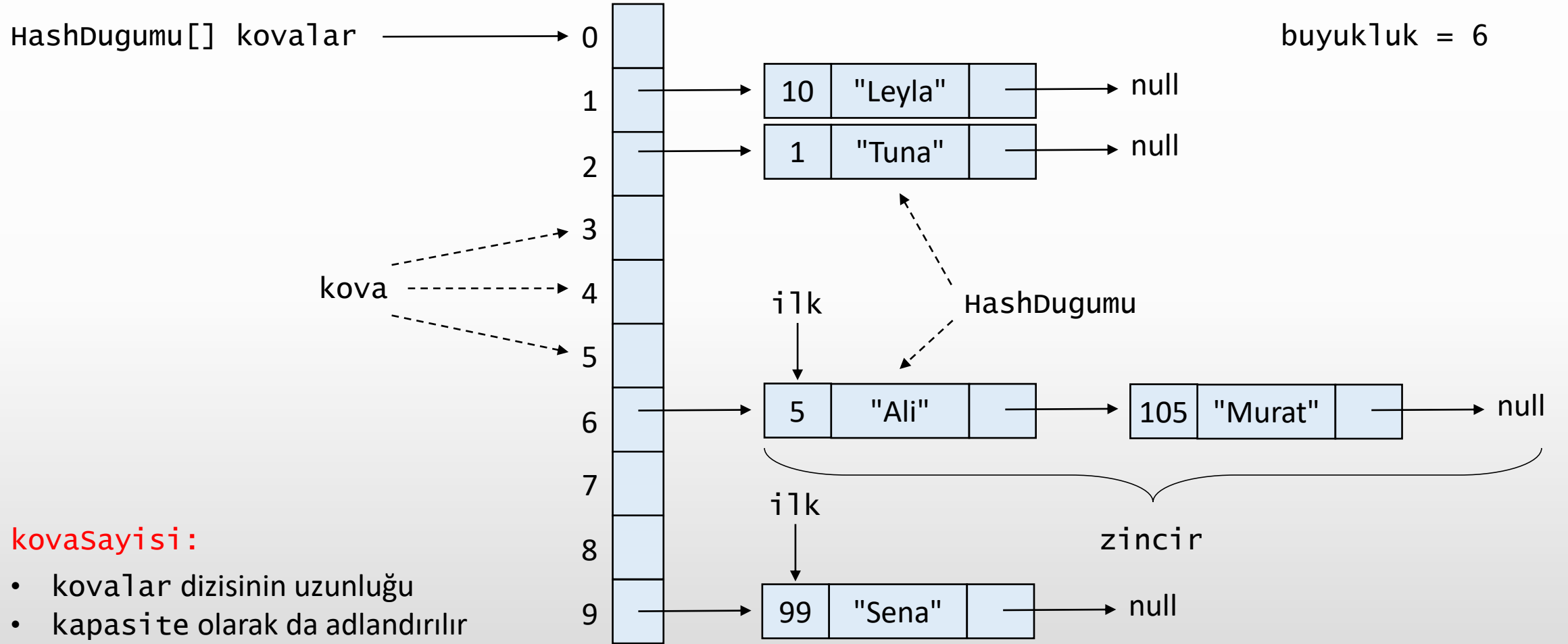
Anahtar - Değer Uzayı







Hash Tablosu Terminolojisi



Hash Tablosu Uygulama





```
public class HashTablosu {
    private HashDugumu[] kovalar;
    private int kovaSayisi;
    private int buyukluk;

    public HashTablosu(int kapasite) {
        this.kovaSayisi = kapasite;
        this.kovalar = new HashDugumu[kapasite];
        this.buyukluk = 0;
    }

    private class HashDugumu {
        private Integer anahtar;
        private String deger;
        private HashDugumu sonraki;

        public HashDugumu(Integer anahtar, String deger) {
            this.anahtar = anahtar;
            this.deger = deger;
        }
    }
}

kapasite = 10
HashTablosu tablo = new HashTablosu(10); }
```



kovaSayisi = 10



```
kapasite = 10
HashTablosu tablo = new HashTablosu(10); }
```

```
public class HashTablosu {
    private HashDugumu[] kovalar;
    private int kovaSayisi;
    private int buyukluk;

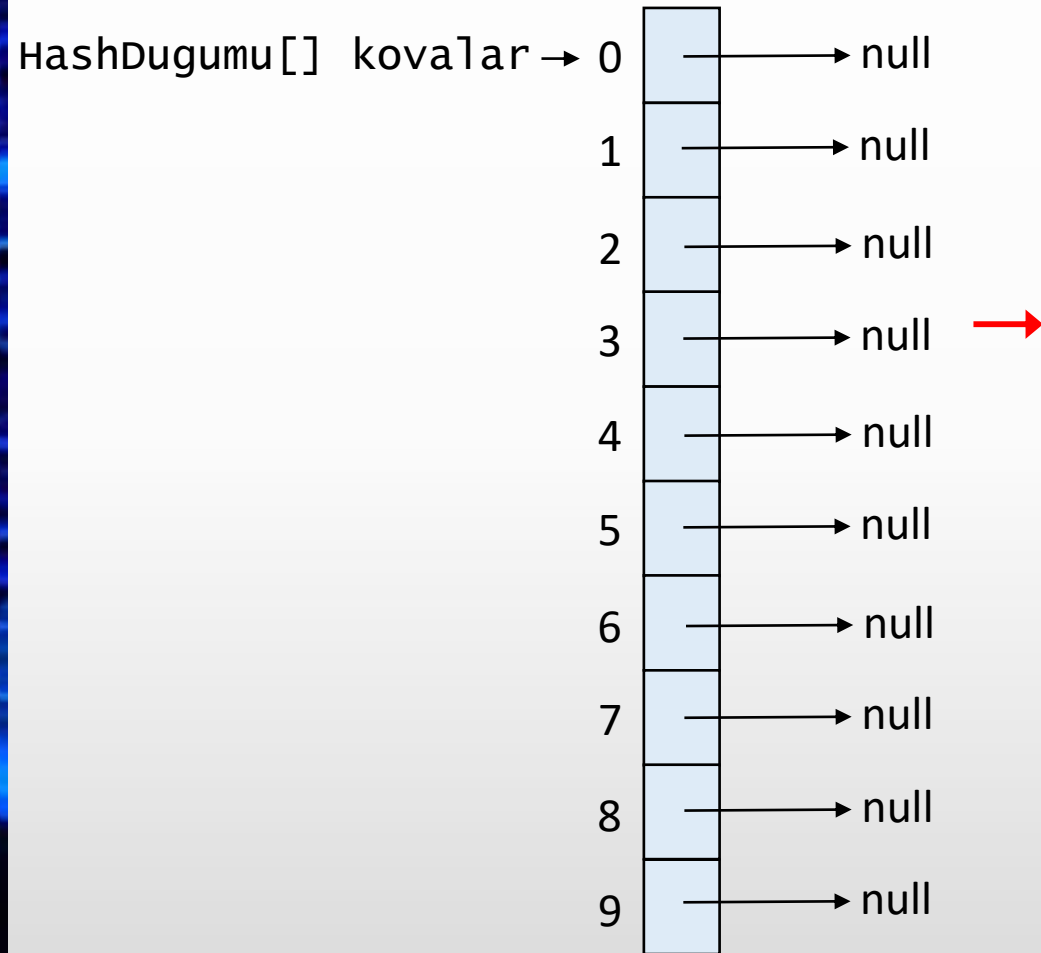
    public HashTablosu(int kapasite) {
        this.kovaSayisi = kapasite;
        this.kovalar = new HashDugumu[kapasite];
        this.buyukluk = 0;
    }

    private class HashDugumu {
        private Integer anahtar;
        private String deger;
        private HashDugumu sonraki;

        public HashDugumu(Integer anahtar, String deger) {
            this.anahtar = anahtar;
            this.deger = deger;
        }
    }
}
```



kovaSayisi = 10



kapasite = 10

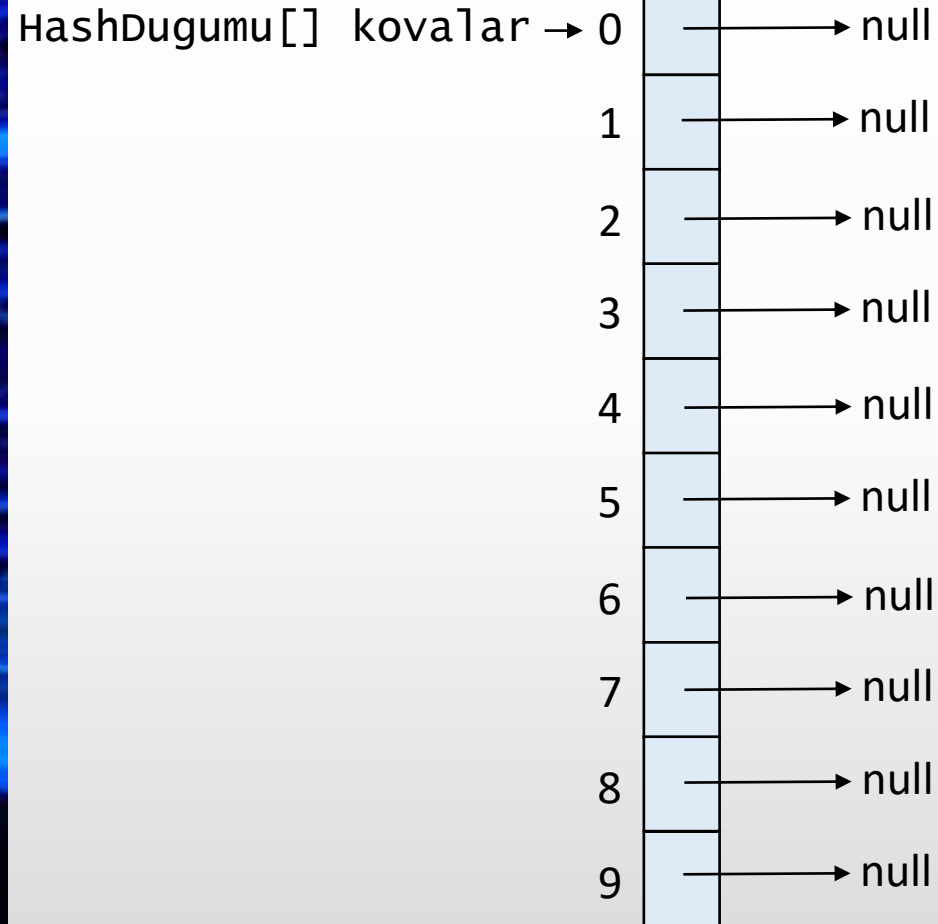
```
HashTablosu tablo = new HashTablosu(10); }
```

```
public class HashTablosu {  
    private HashDugumu[] kovalar;  
    private int kovaSayisi;  
    private int buyukluk;  
  
    public HashTablosu(int kapasite) {  
        this.kovaSayisi = kapasite;  
        this.kovalar = new HashDugumu[kapasite];  
        this.buyukluk = 0;  
    }  
  
    private class HashDugumu {  
        private Integer anahtar;  
        private String deger;  
        private HashDugumu sonraki;  
  
        public HashDugumu(Integer anahtar, String deger) {  
            this.anahtar = anahtar;  
            this.deger = deger;  
        }  
    }  
}
```



kovaSayisi = 10

buyukluk = 0



kapasite = 10

HashTablosu tablo = new HashTablosu(10); }

```
public class HashTablosu {
    private HashDugumu[] kovalar;
    private int kovaSayisi;
    private int buyukluk;

    public HashTablosu(int kapasite) {
        this.kovaSayisi = kapasite;
        this.kovalar = new HashDugumu[kapasite];
        this.buyukluk = 0;
    }

    private class HashDugumu {
        private Integer anahtar;
        private String deger;
        private HashDugumu sonraki;

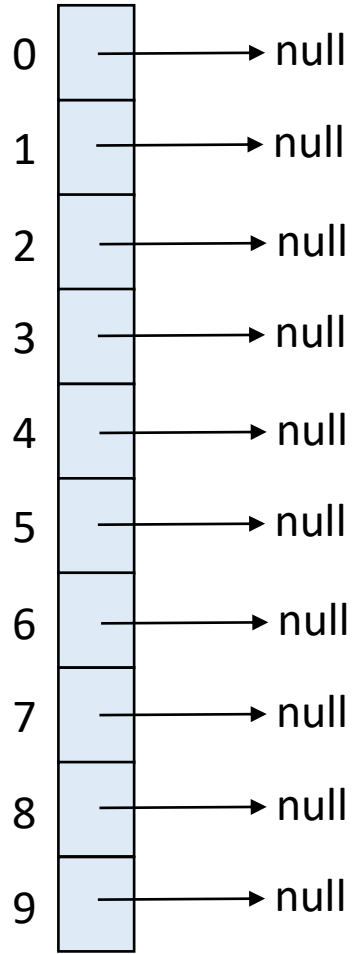
        public HashDugumu(Integer anahtar, String deger) {
            this.anahtar = anahtar;
            this.deger = deger;
        }
    }
}
```

Hash Tablosuna Anahtar - Deęer İkilisi Yerleřtirme



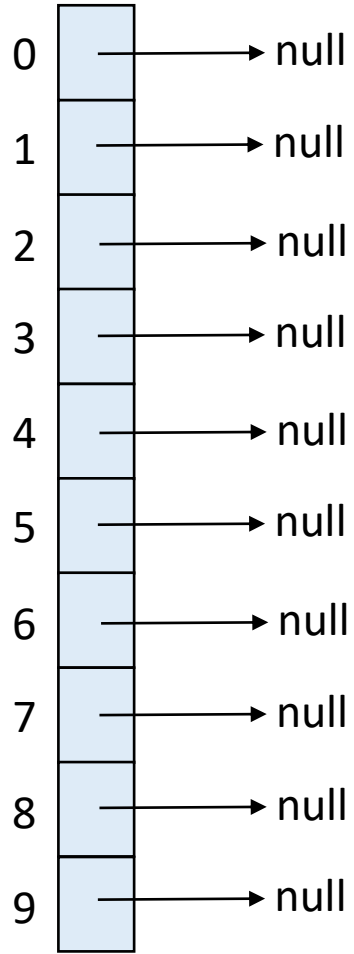
Hash Tablosuna Anahtar - Değer İkilisi Yerleştirme

```
HashTablosu tablo = new HashTablosu(10);
```



↑
HashDugumu[] kovalar

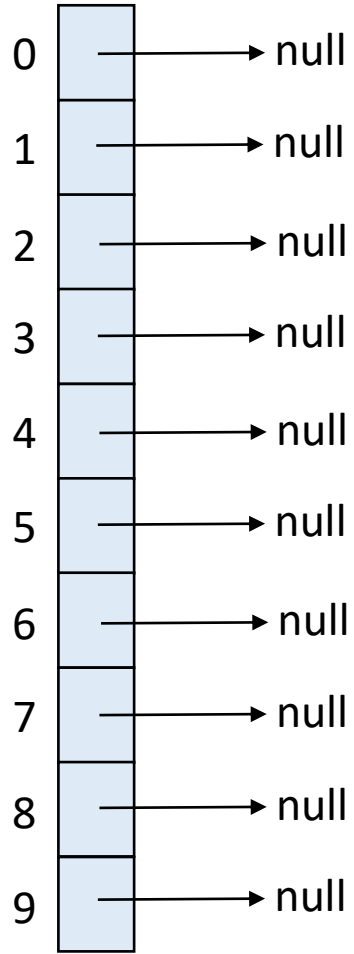
```
HashTablosu tablo = new HashTablosu(10);
```



↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 0

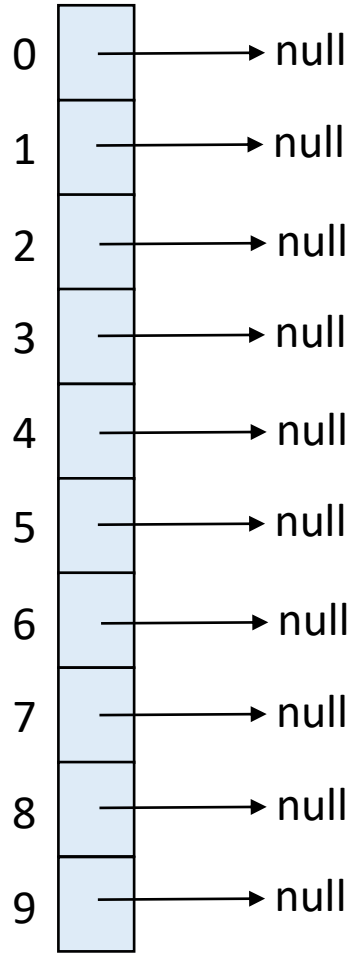
```
HashTablosu tablo = new HashTablosu(10);
```

↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 0

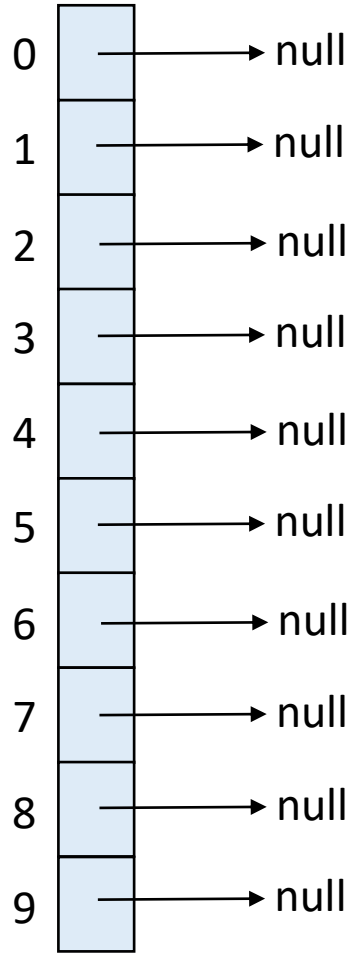
```
tablo.yerlestir(105,"Murat");
```



↑
HashDugumu[] kovalar

```
kovaSayisi = 10  
buyukluk = 0  
anahtar = 105  
deger = "Murat"
```

```
tablo.yerlestir(105,"Murat");
```

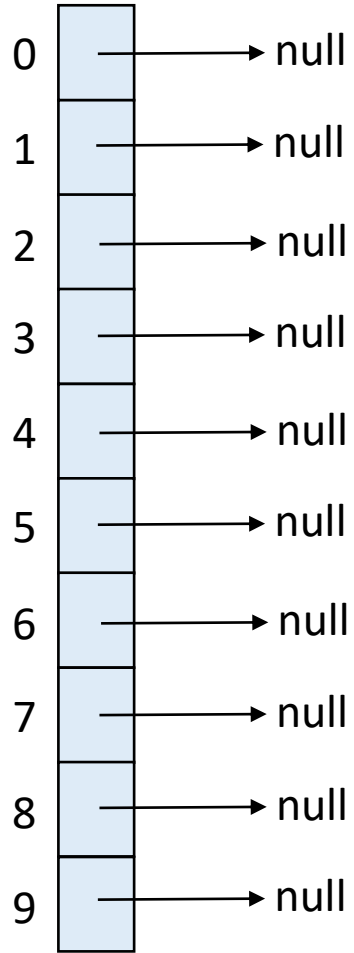


↑
HashDugumu[] kovalar

```
public int getKovaIndeksi(Integer anahtar) {  
    return anahtar % kovalar.length;  
}
```

kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"

```
tablo.yerlestir(105, "Murat");
```

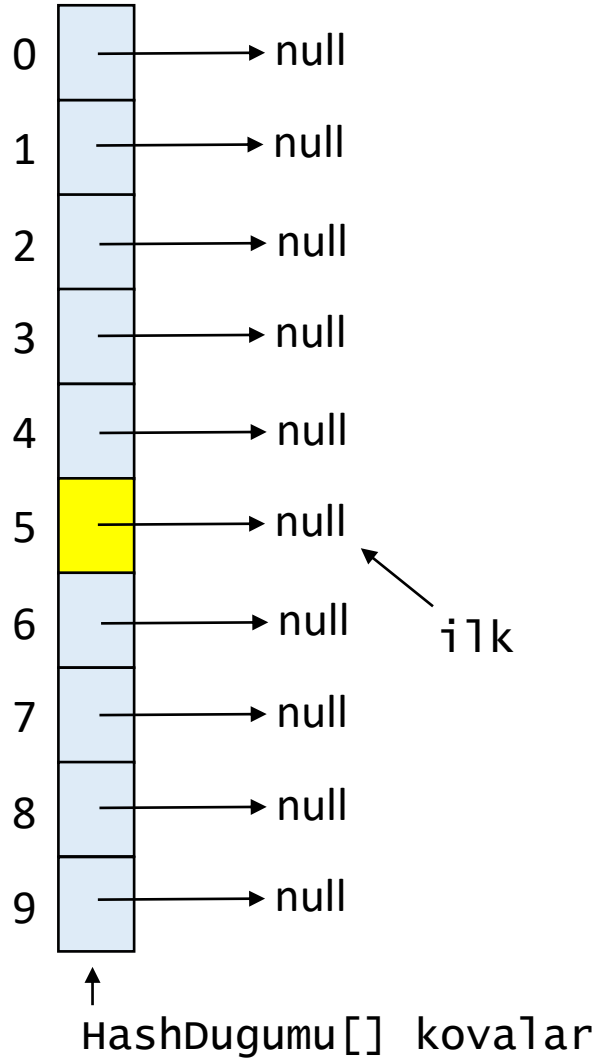


↑
HashDugumu[] kovalar

```
public int getKovaIndeksi(Integer anahtar) {  
    return anahtar % kovalar.length;  
}
```

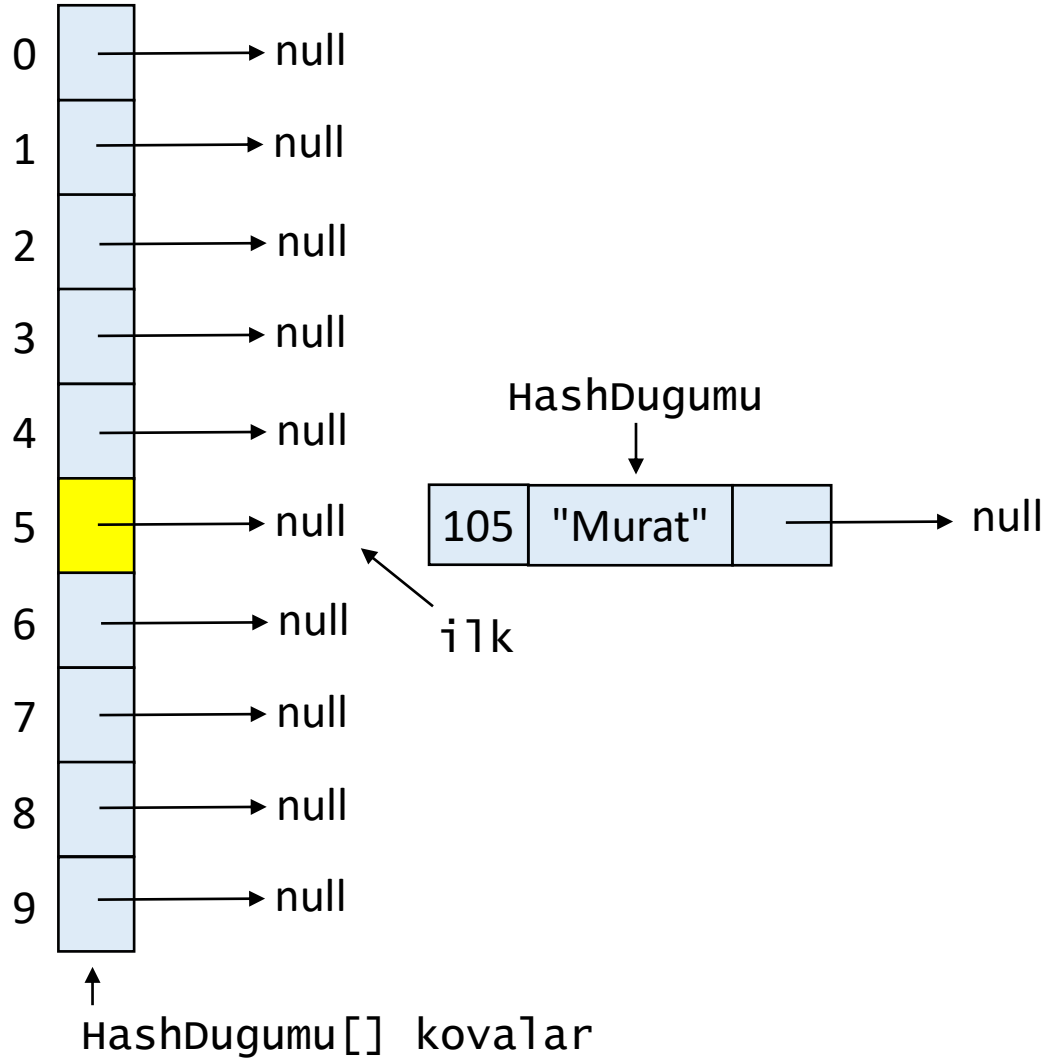
kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
tablo.yerlestir(105, "Murat");
```



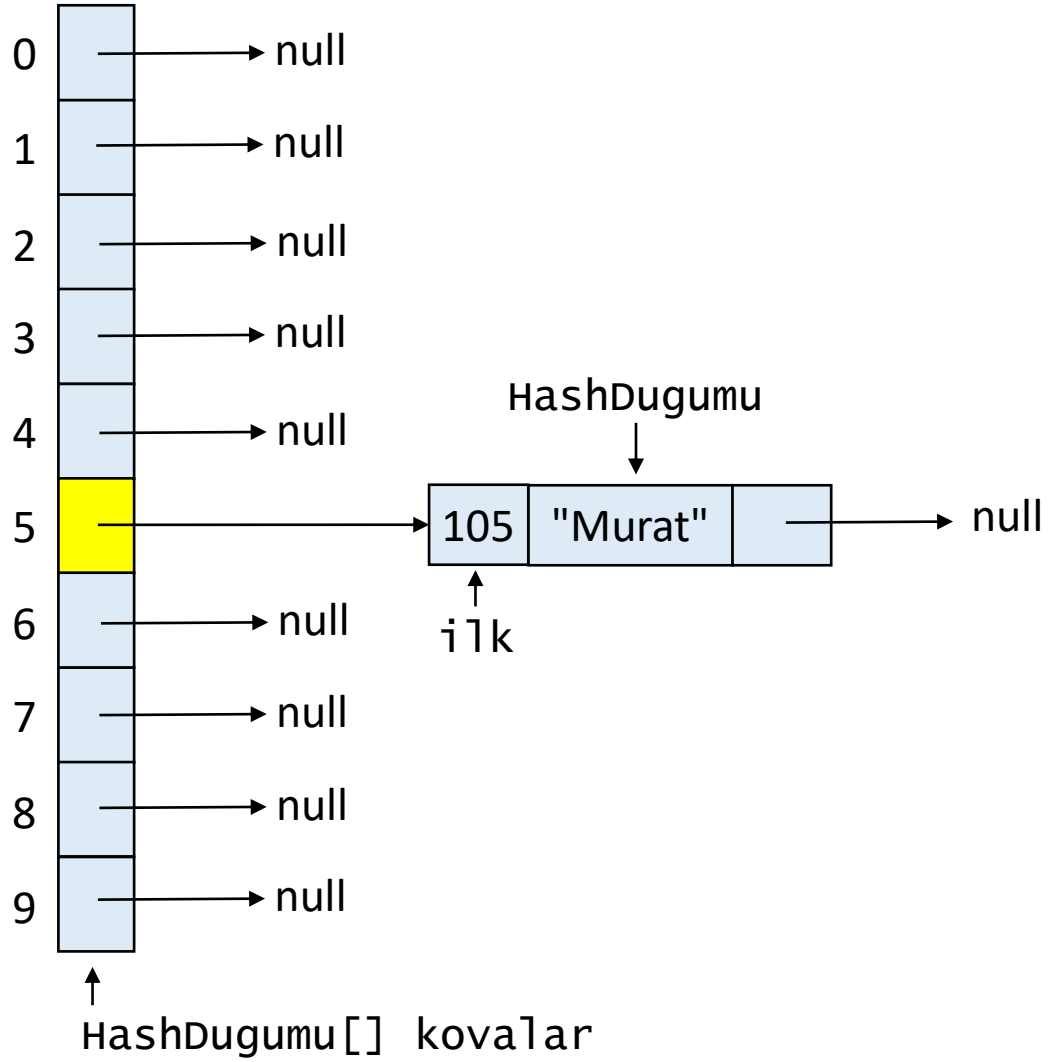
kovaSayisi = 10
buyukluk = 1
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
tablo.yerlestir(105,"Murat");
```



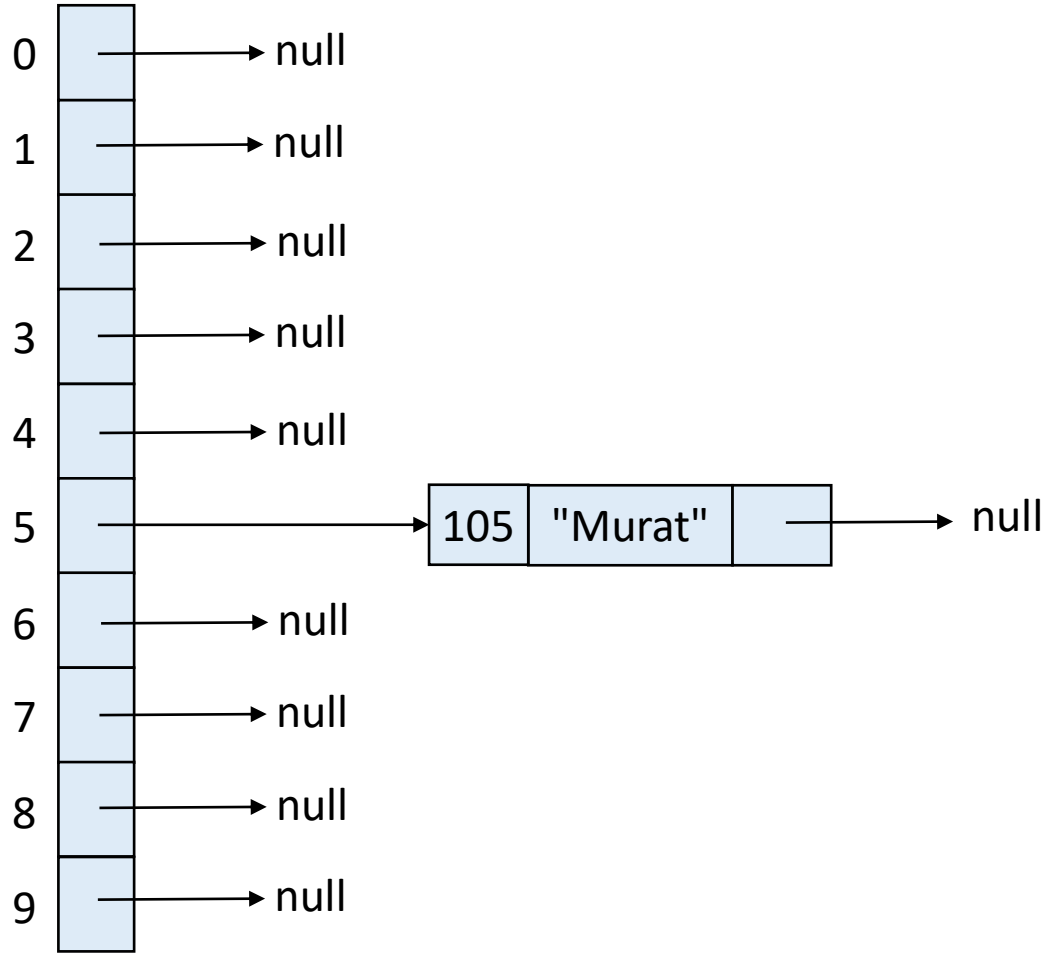
kovaSayisi = 10
buyukluk = 1
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
tablo.yerlestir(105,"Murat");
```



kovaSayisi = 10
buyukluk = 1
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

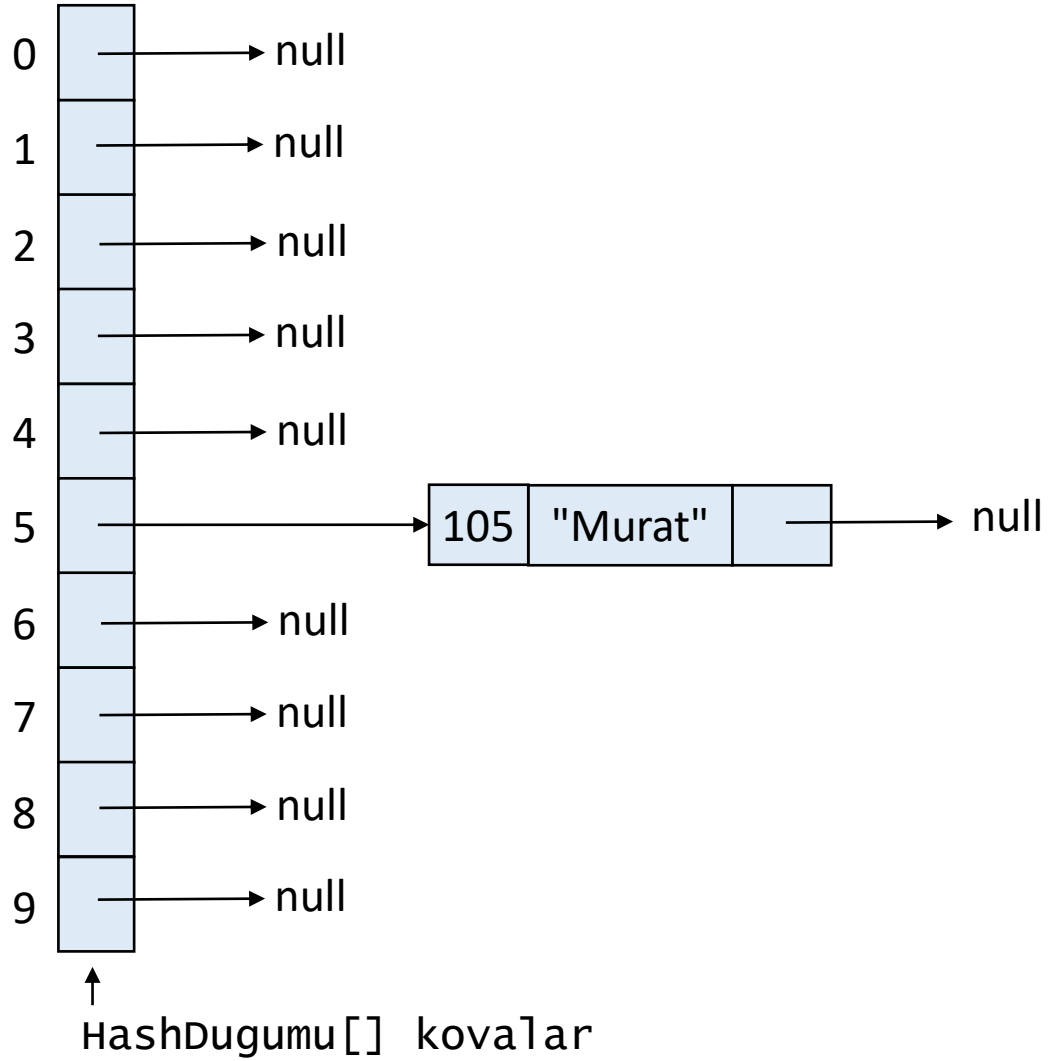
```
tablo.yerlestir(105,"Murat");
```



kovaSayisi = 10
buyukluk = 1

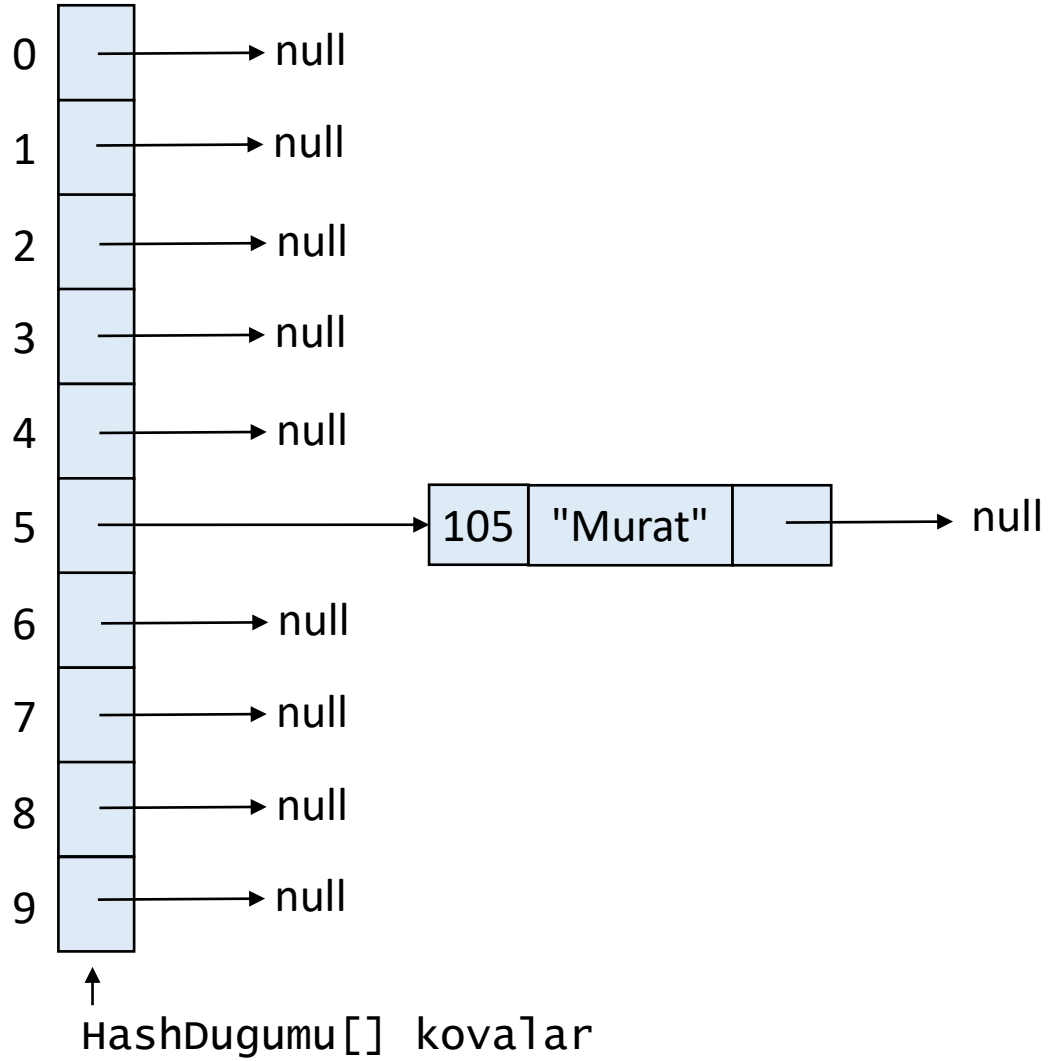
↑
HashDugumu[] kovalar

```
tablo.yerlestir(21,"Leyla");
```

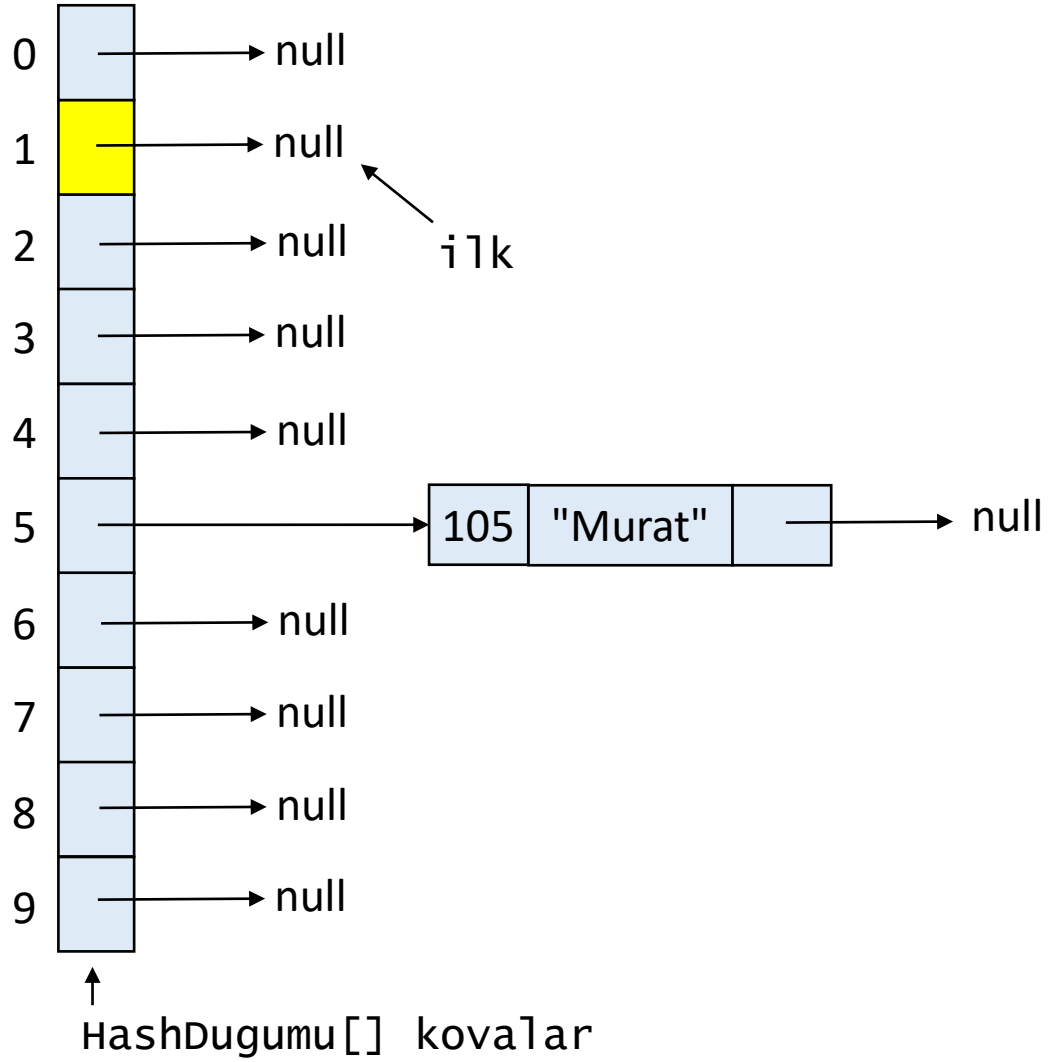
kovaSayisi = 10
buyukluk = 1
anahtar = 21
deger = "Leyla"

```
tablo.yerlestir(21,"Leyla");
```



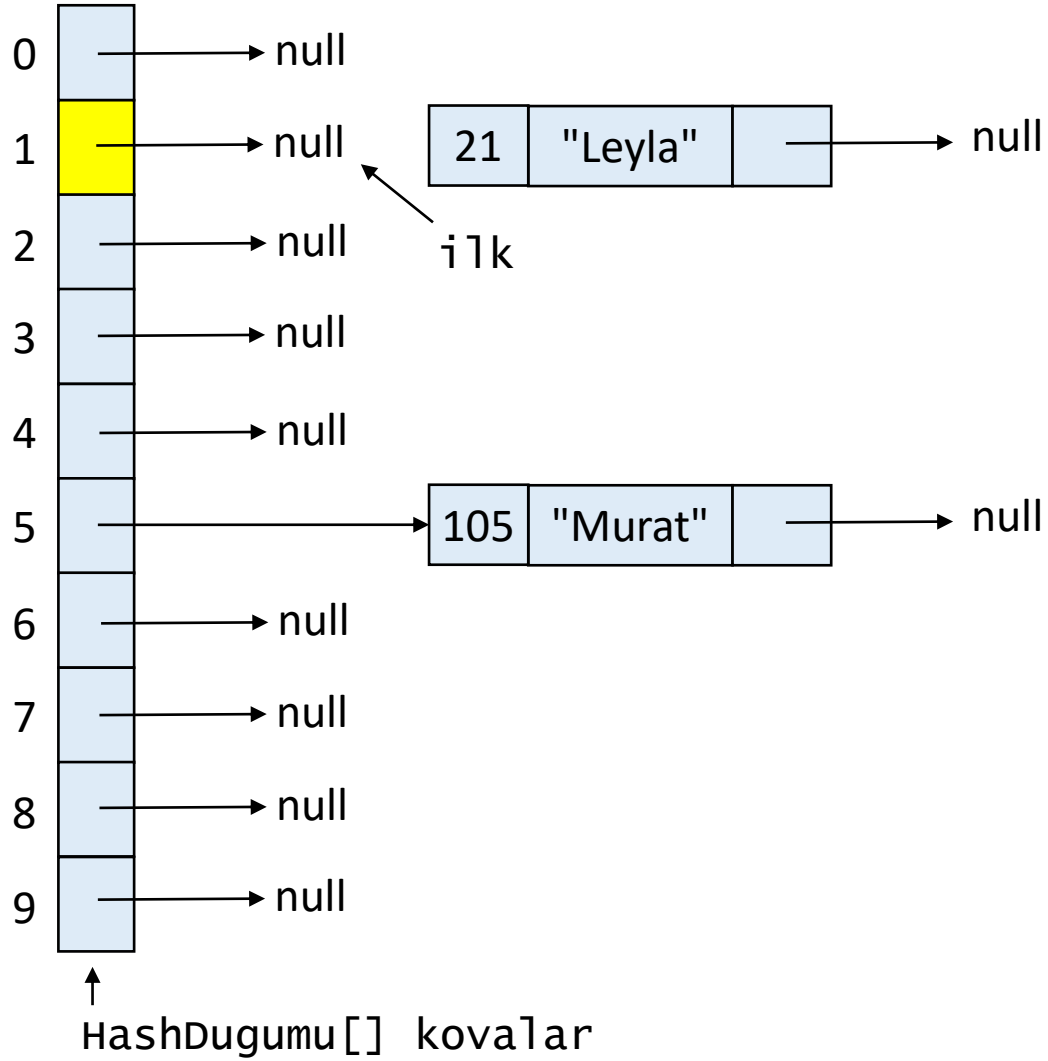
kovaSayisi = 10
buyukluk = 1
anahtar = 21
deger = "Leyla"
kovaIndeksi = 1

```
tablo.yerlestir(21,"Leyla");
```



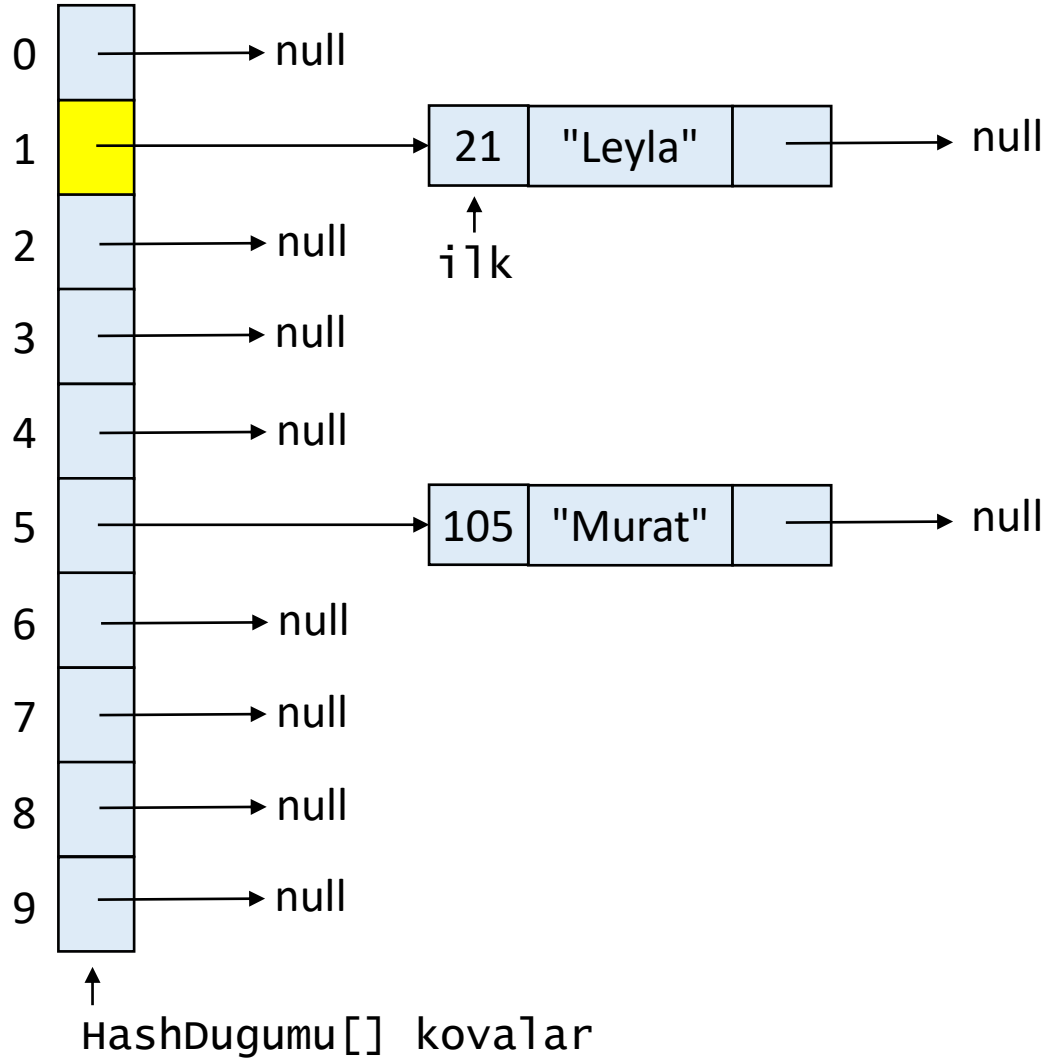
kovaSayisi = 10
buyukluk = 2
anahtar = 21
deger = "Leyla"
kovaIndeksi = 1

```
tablo.yerlestir(21,"Leyla");
```



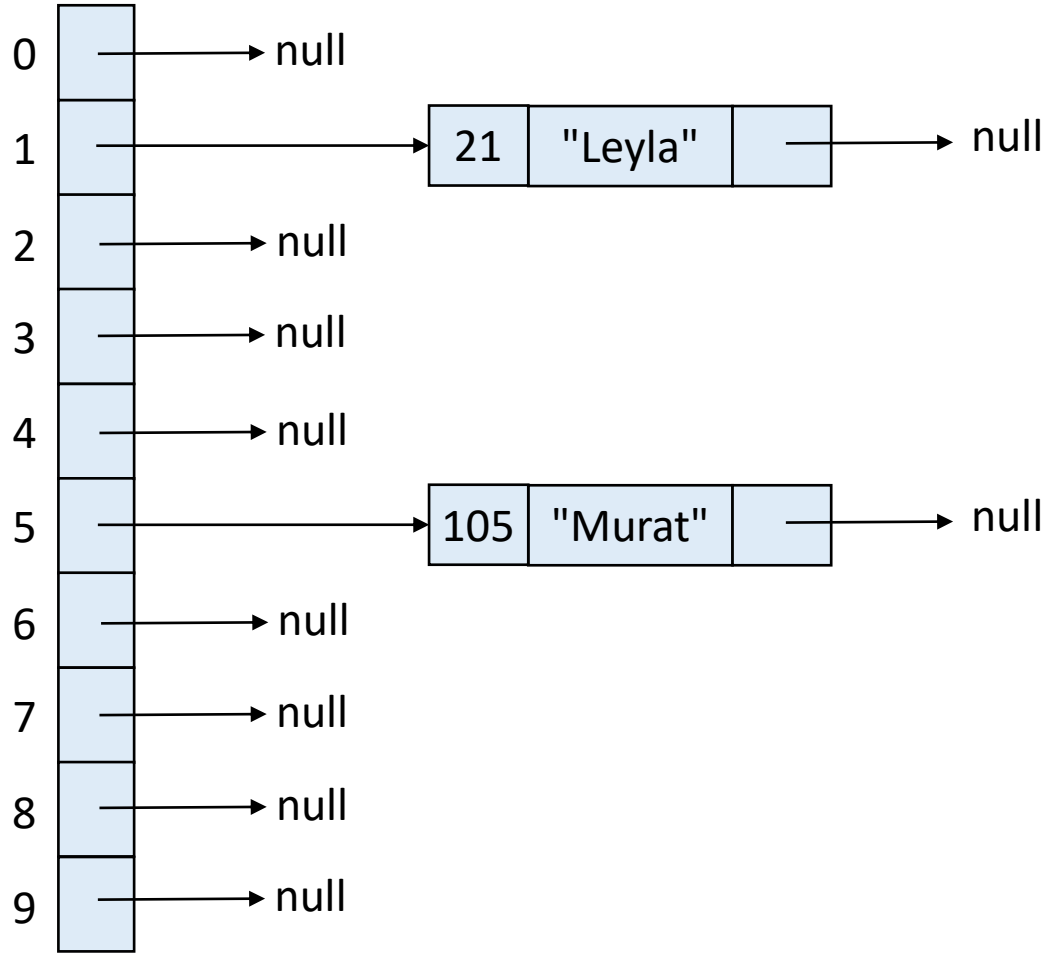
kovaSayisi = 10
buyukluk = 2
anahtar = 21
deger = "Leyla"
kovaIndeksi = 1

```
tablo.yerlestir(21,"Leyla");
```



kovaSayisi = 10
buyukluk = 2
anahtar = 21
deger = "Leyla"
kovaIndeksi = 1

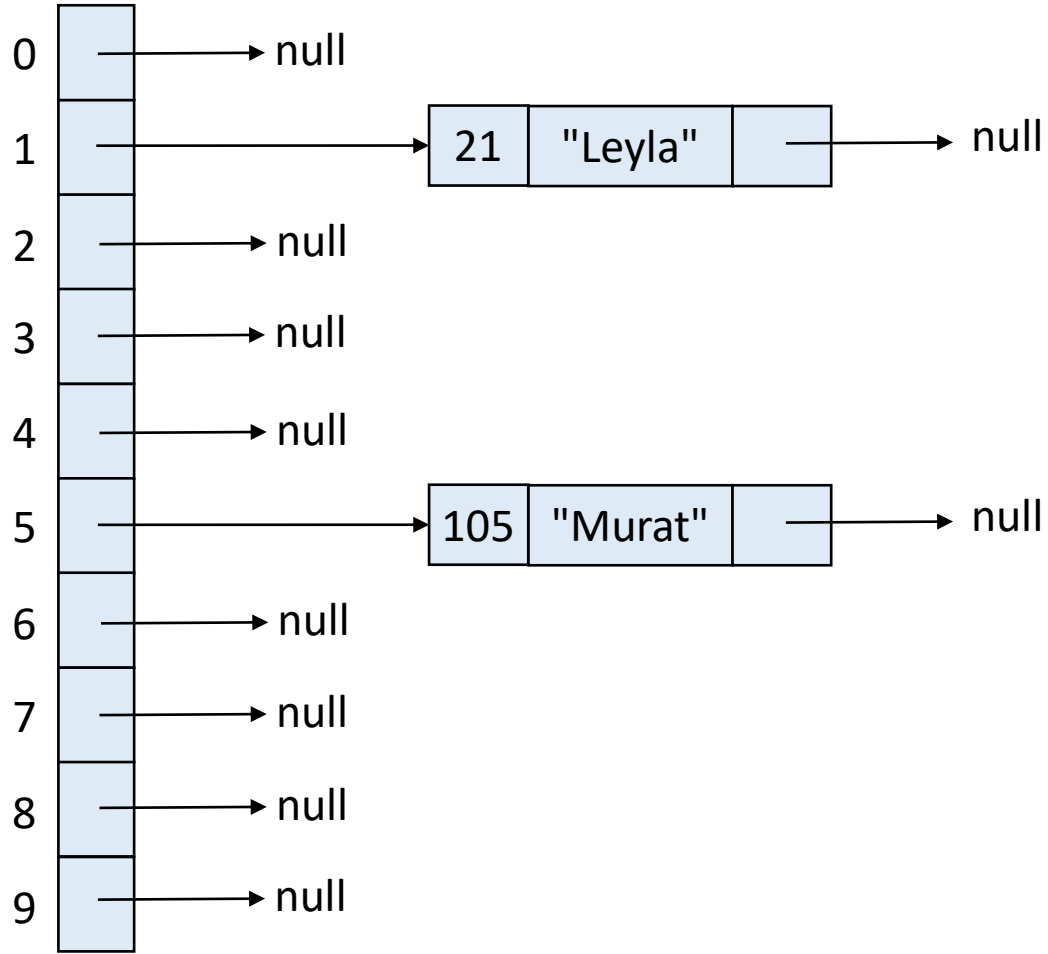
```
tablo.yerlestir(21,"Leyla");
```



kovaSayisi = 10
buyukluk = 2

↑
HashDugumu[] kovalar

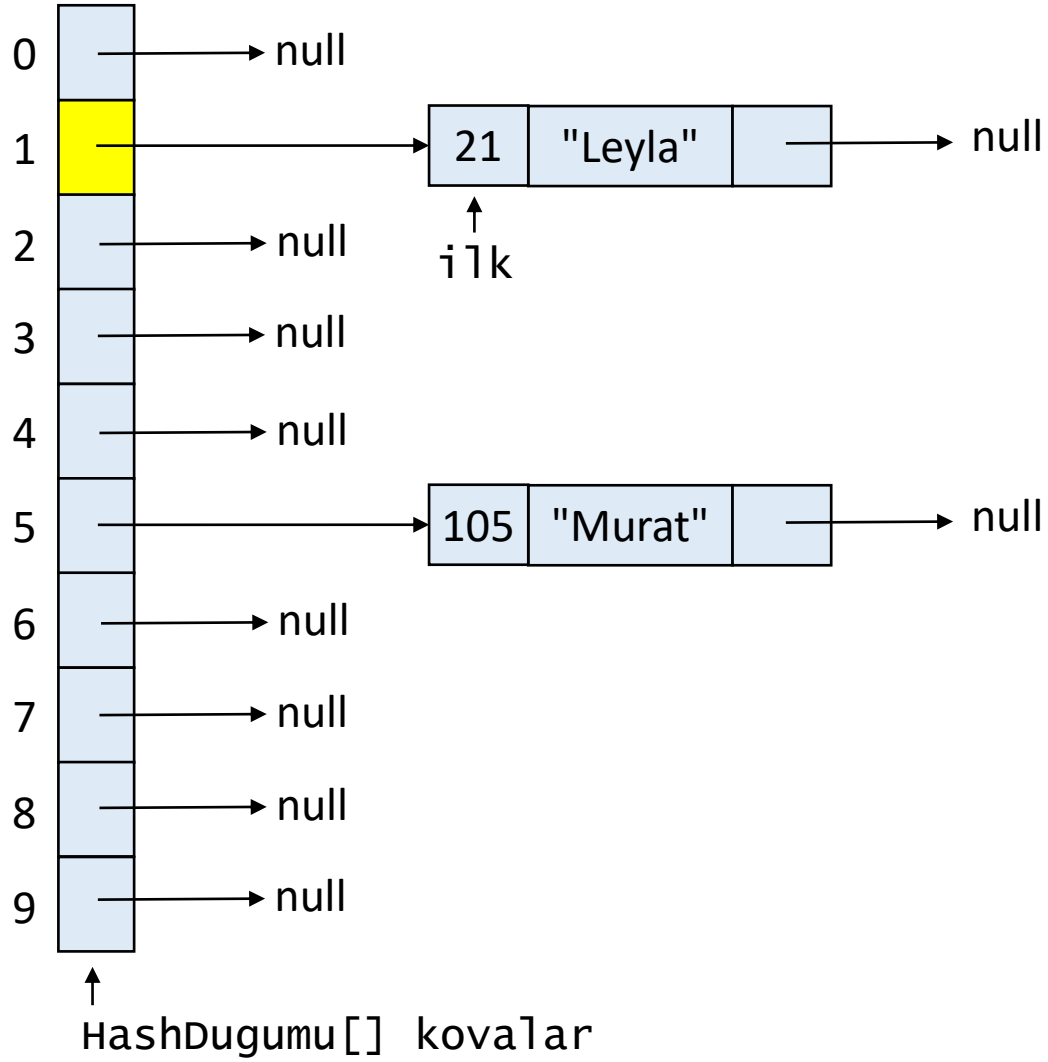
```
tablo.yerlestir(41,"Sena");
```



↑
HashDugumu[] kovalar

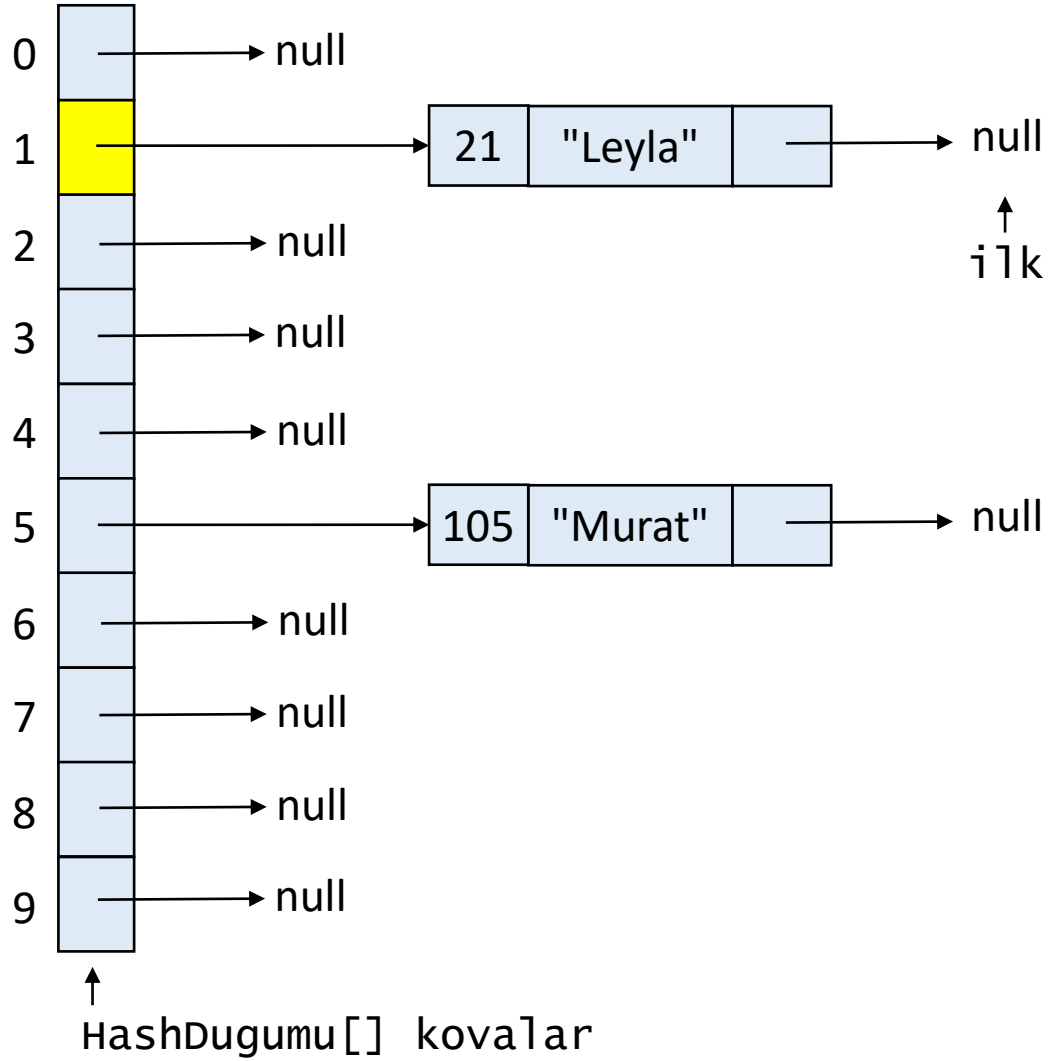
kovaSayisi = 10
buyukluk = 2
anahtar = 41
deger = "Sena"

```
tablo.yerlestir(41,"Sena");
```



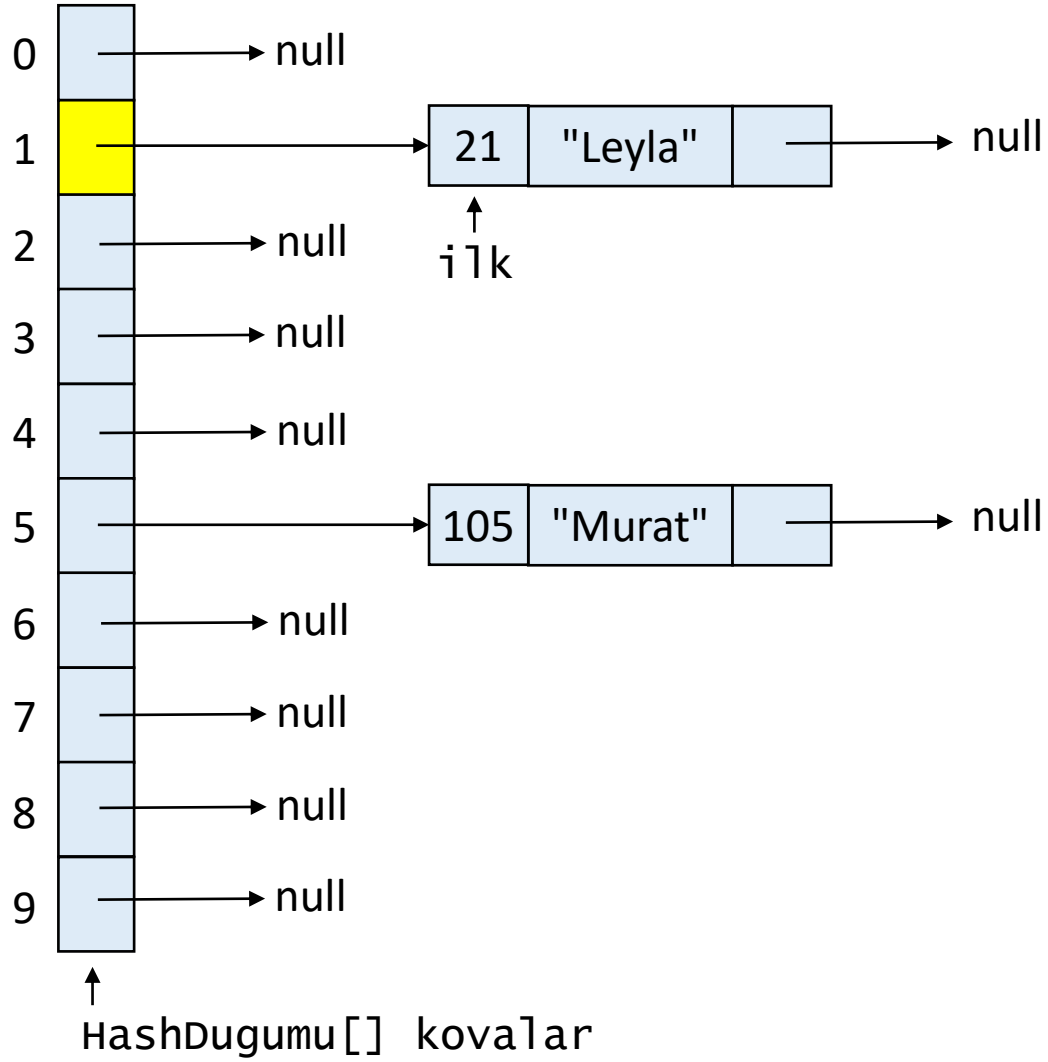
kovaSayisi = 10
buyukluk = 2
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

```
tablo.yerlestir(41,"Sena");
```

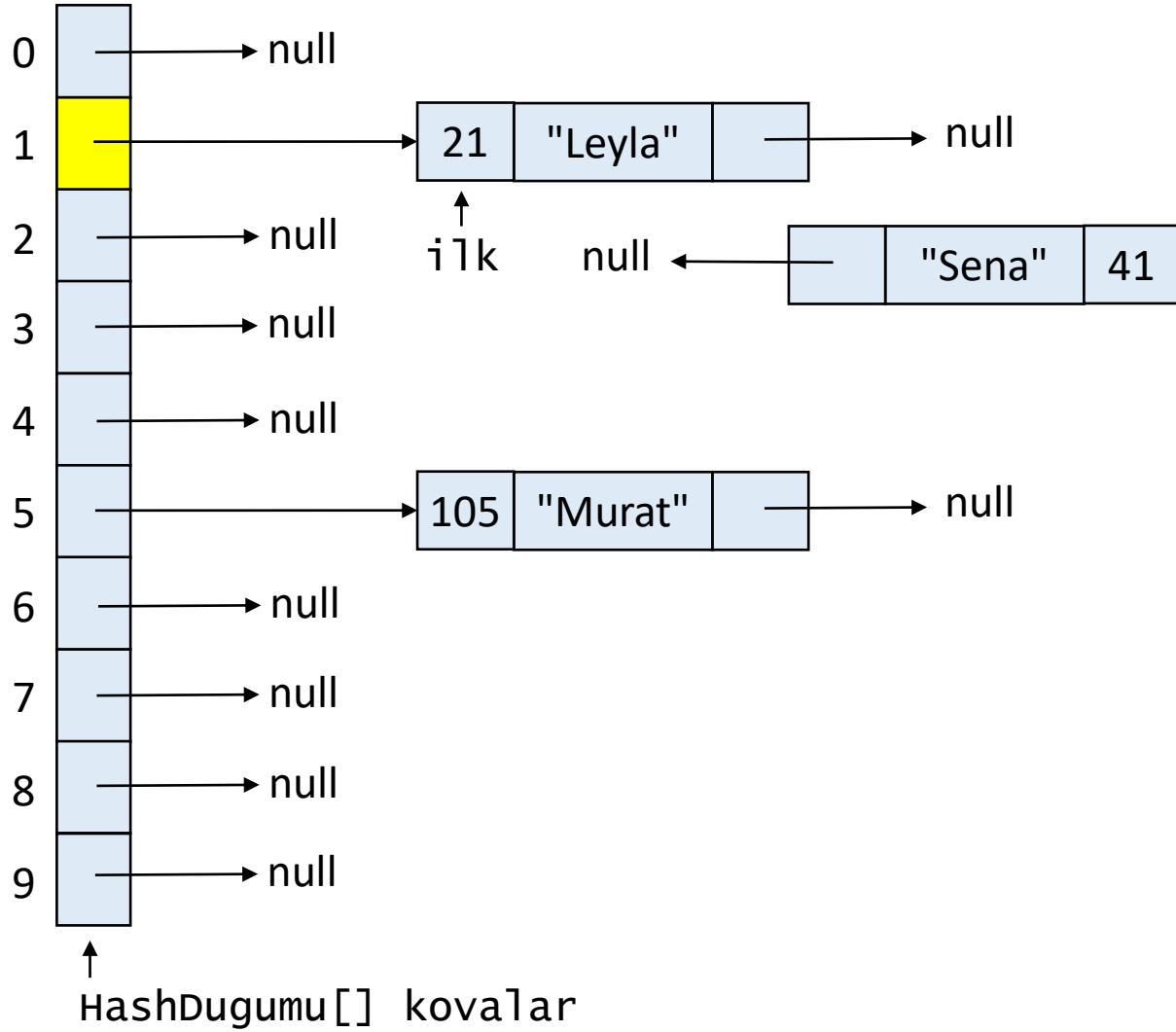
kovaSayisi = 10
buyukluk = 2
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

```
tablo.yerlestir(41,"Sena");
```



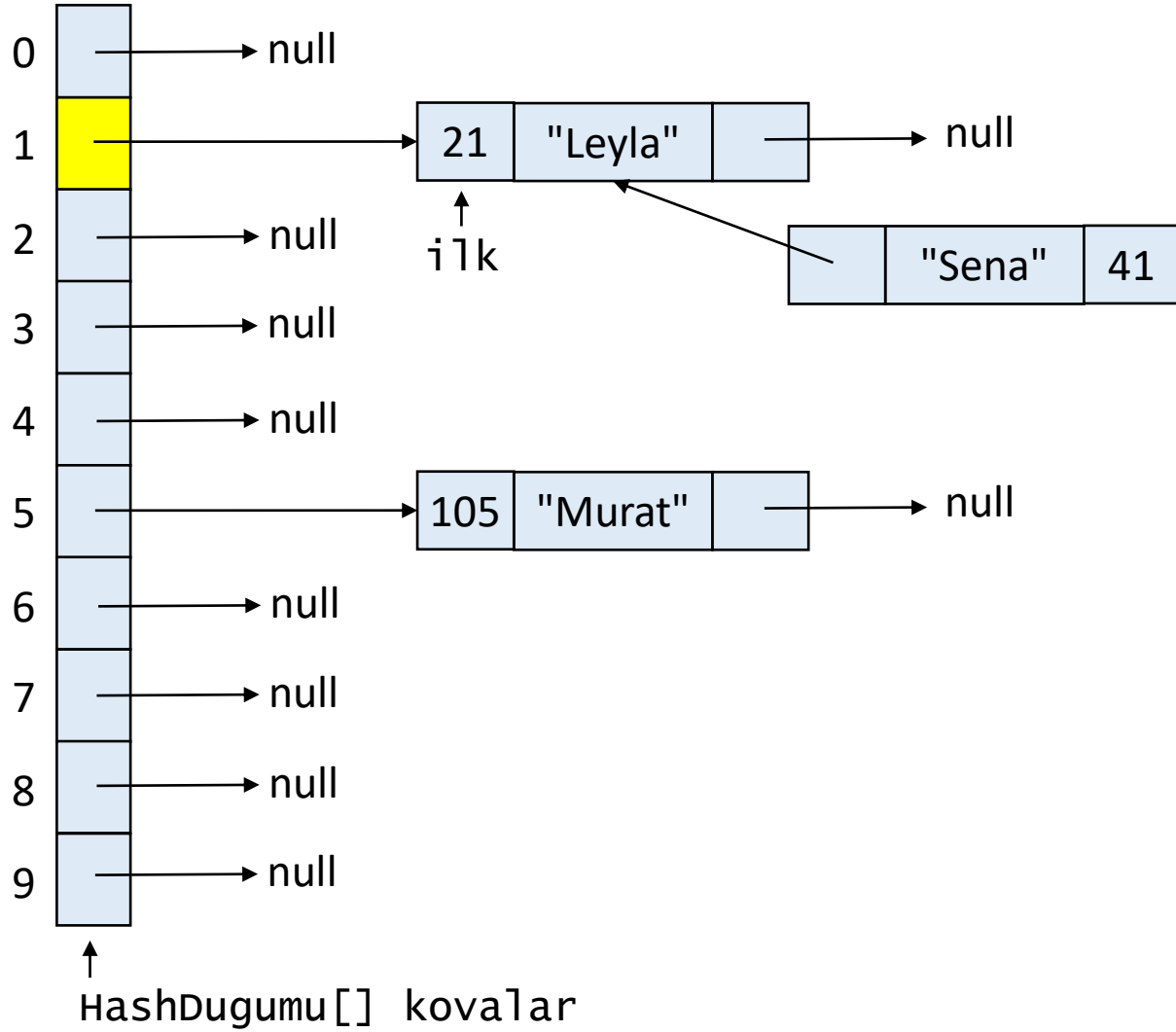
kovaSayisi = 10
buyukluk = 3
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

```
tablo.yerlestir(41,"Sena");
```



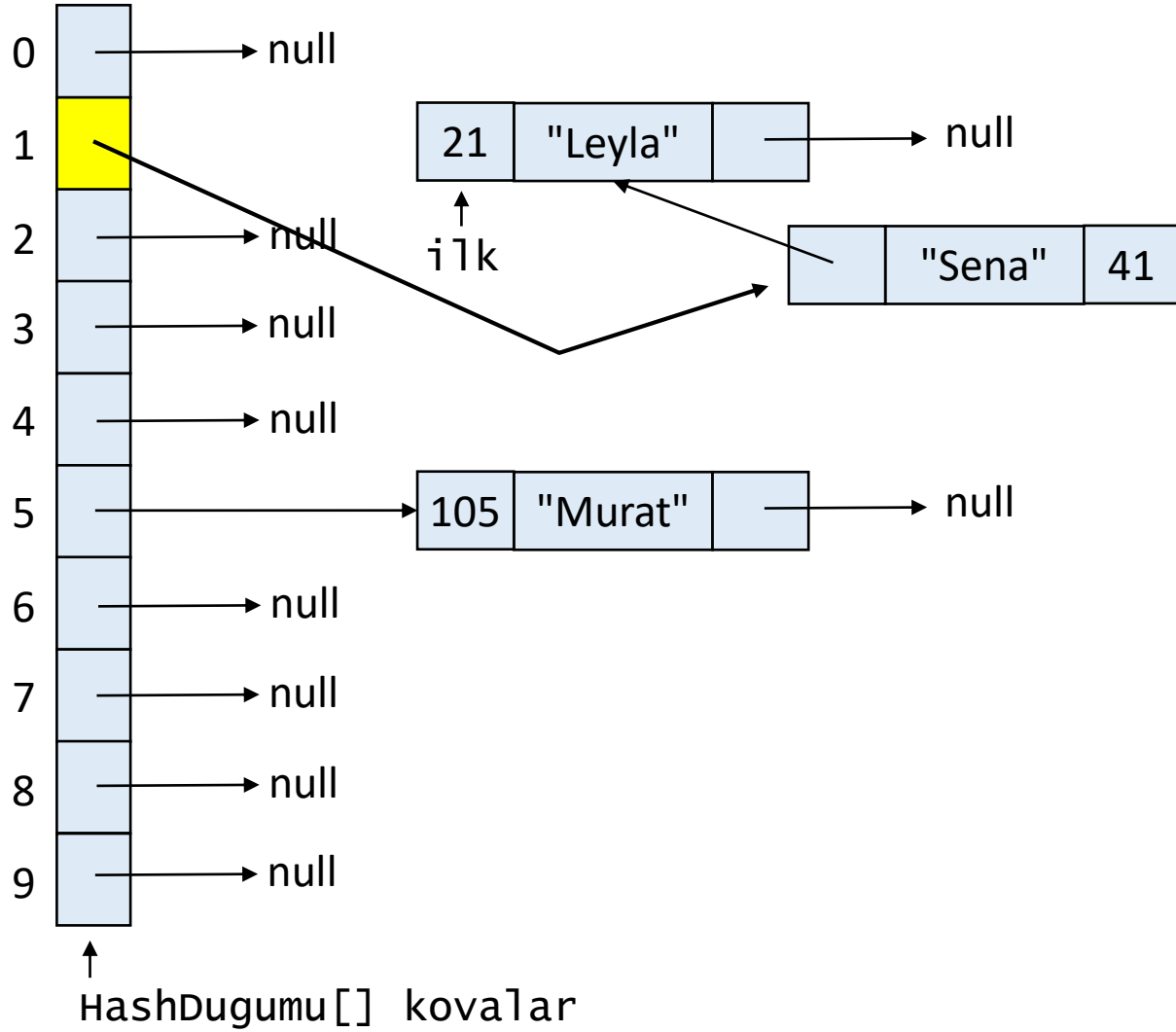
kovaSayisi = 10
buyukluk = 3
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

```
tablo.yerlestir(41,"Sena");
```



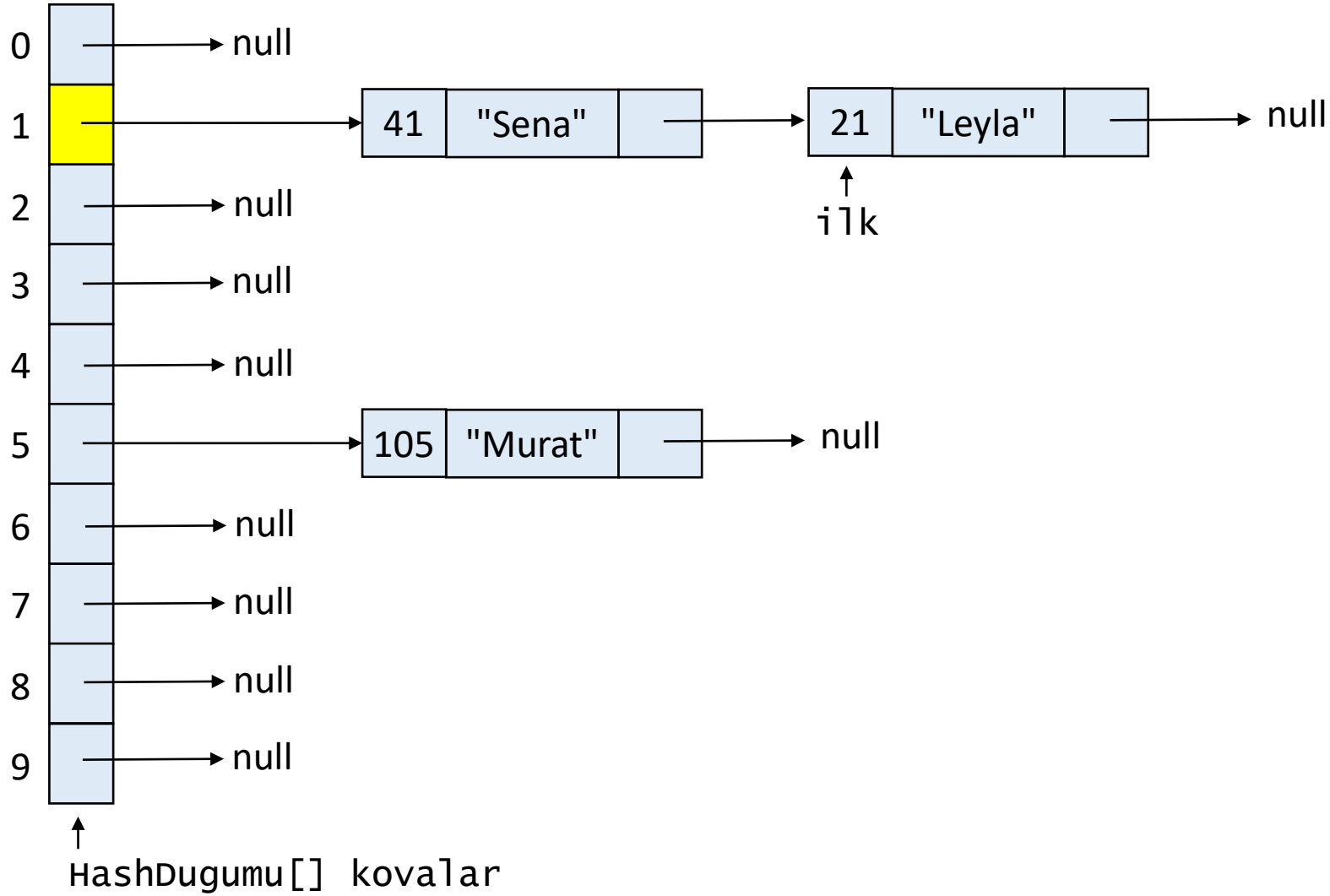
kovaSayisi = 10
buyukluk = 3
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

```
tablo.yerlestir(41,"Sena");
```



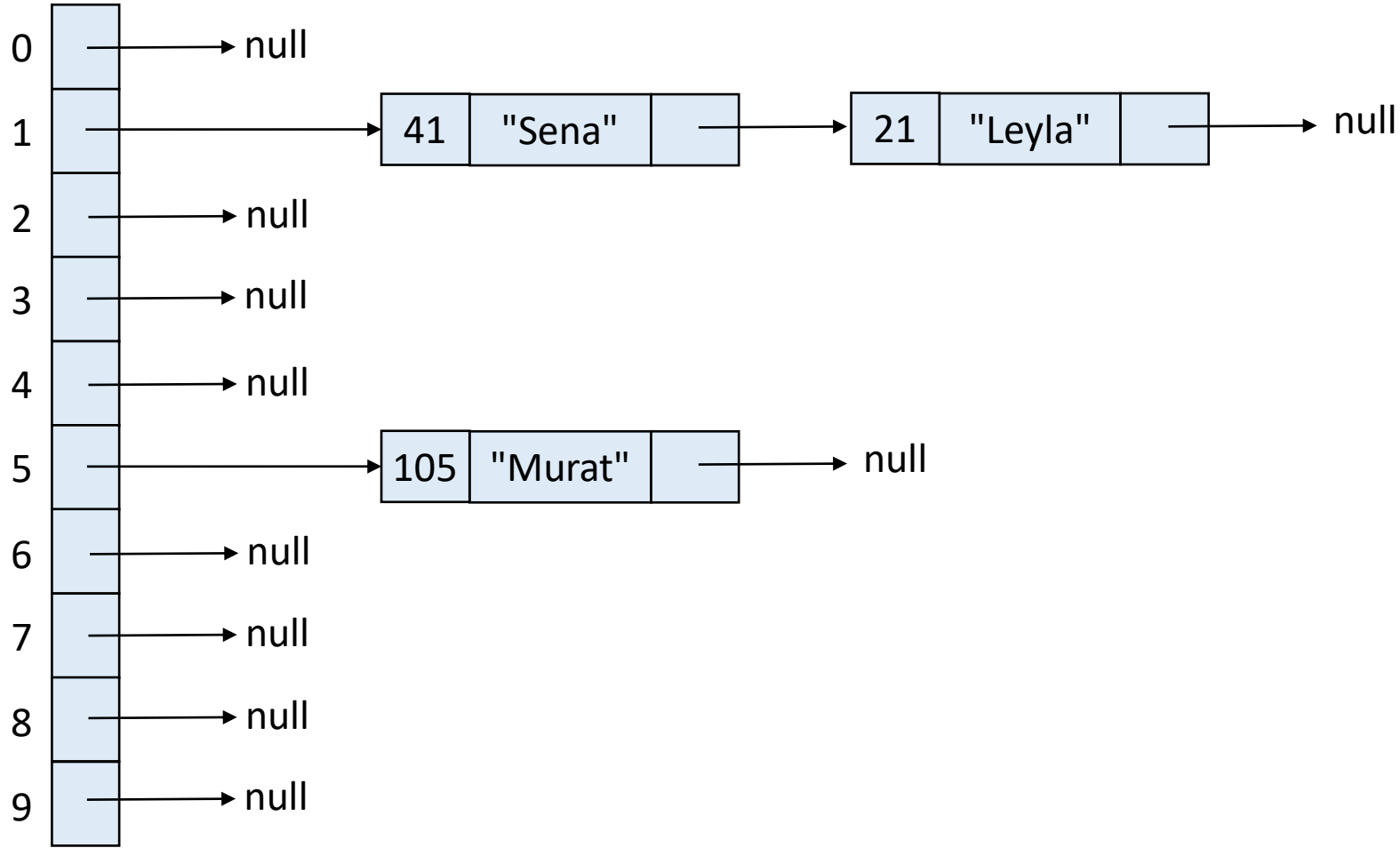
kovaSayisi = 10
buyukluk = 3
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

```
tablo.yerlestir(41,"Sena");
```



kovaSayisi = 10
buyukluk = 3
anahtar = 41
deger = "Sena"
kovaIndeksi = 1

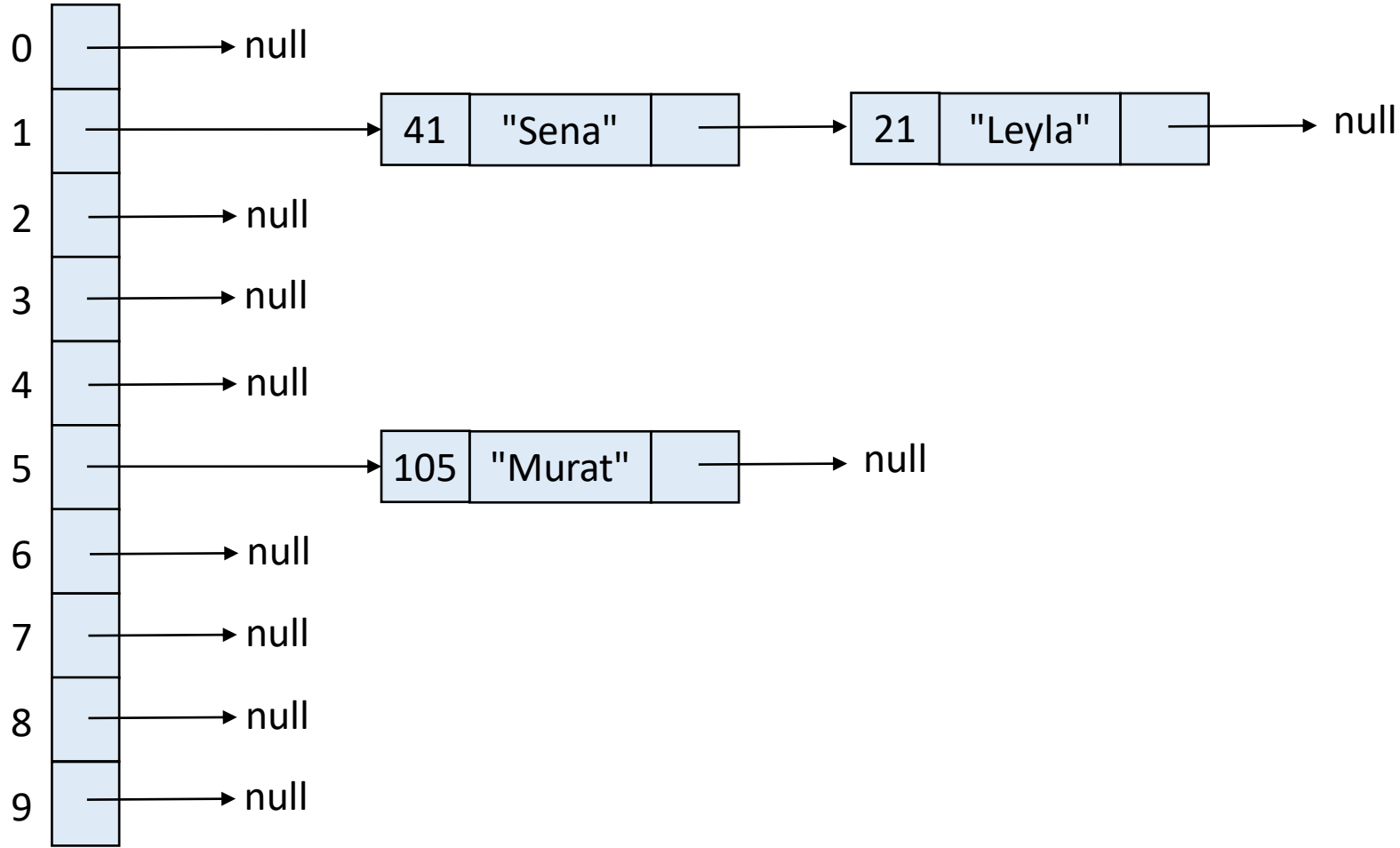
```
tablo.yerlestir(41,"Sena");
```



kovaSayisi = 10
buyukluk = 3

↑
HashDugumu[] kovalar

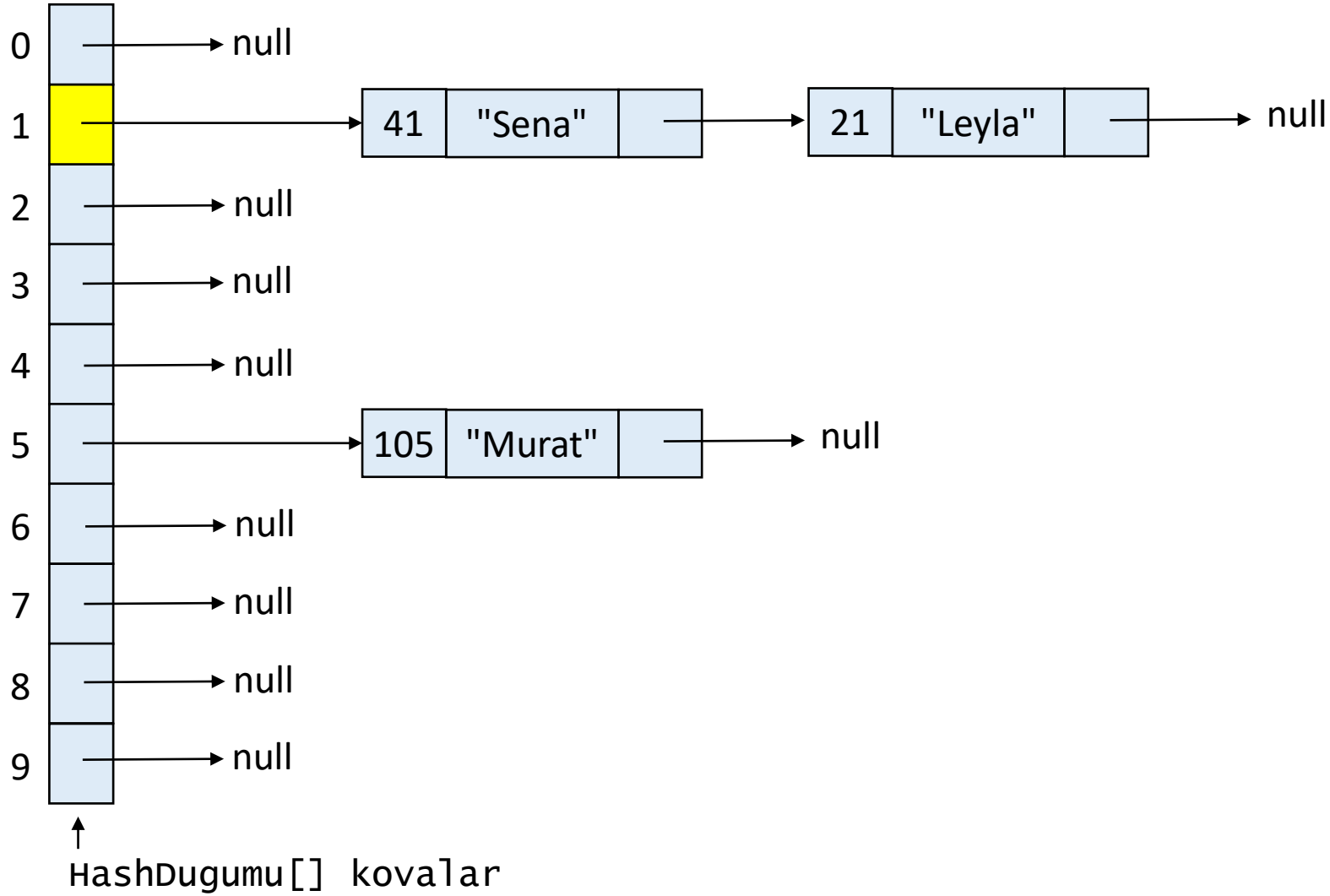
```
tablo.yerlestir(21,"Ali");
```



kovaSayisi = 10
buyukluk = 3
anahtar = 21
deger = "Ali"

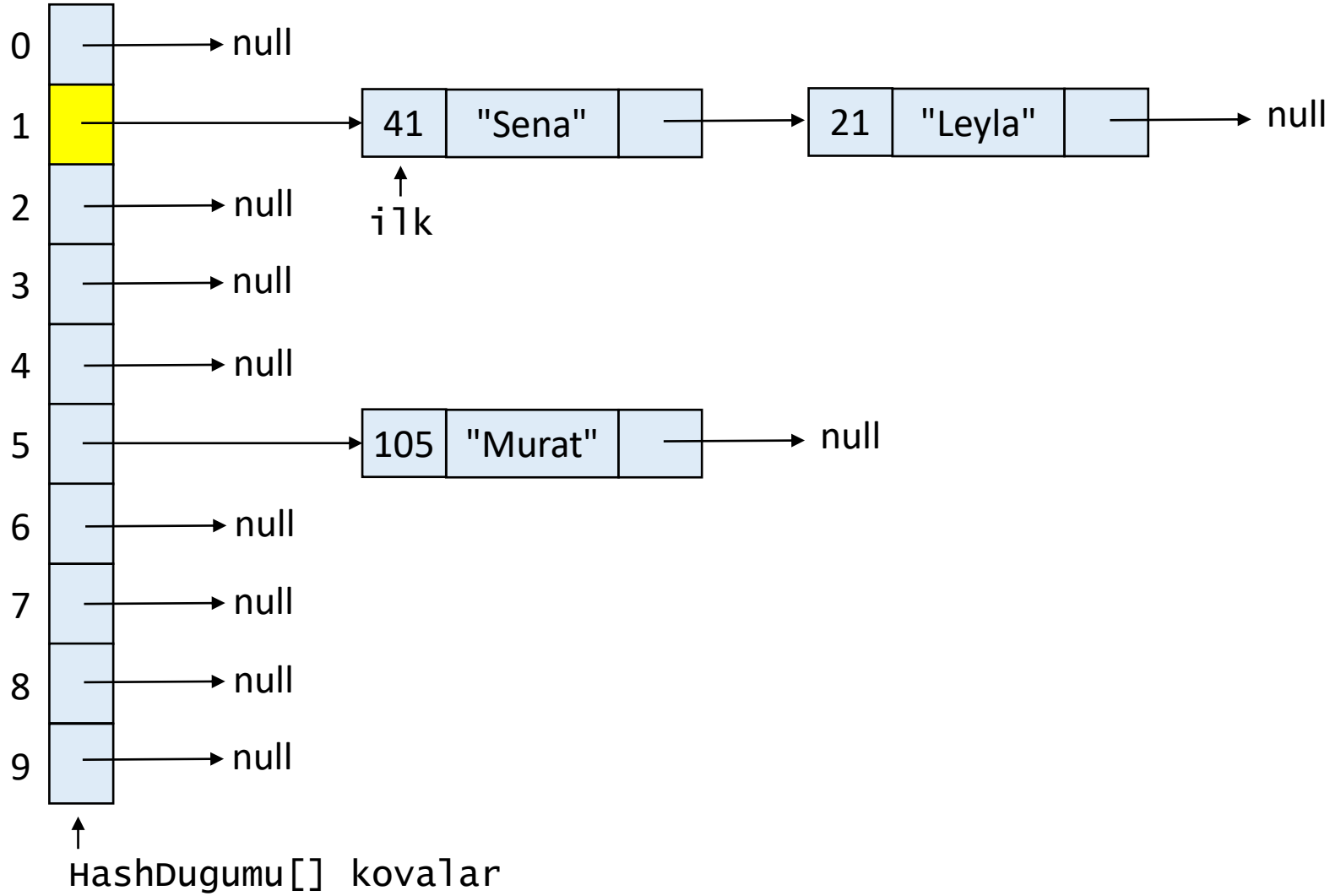
↑
HashDugumu[] kovalar

```
tablo.yerlestir(21,"Ali");
```

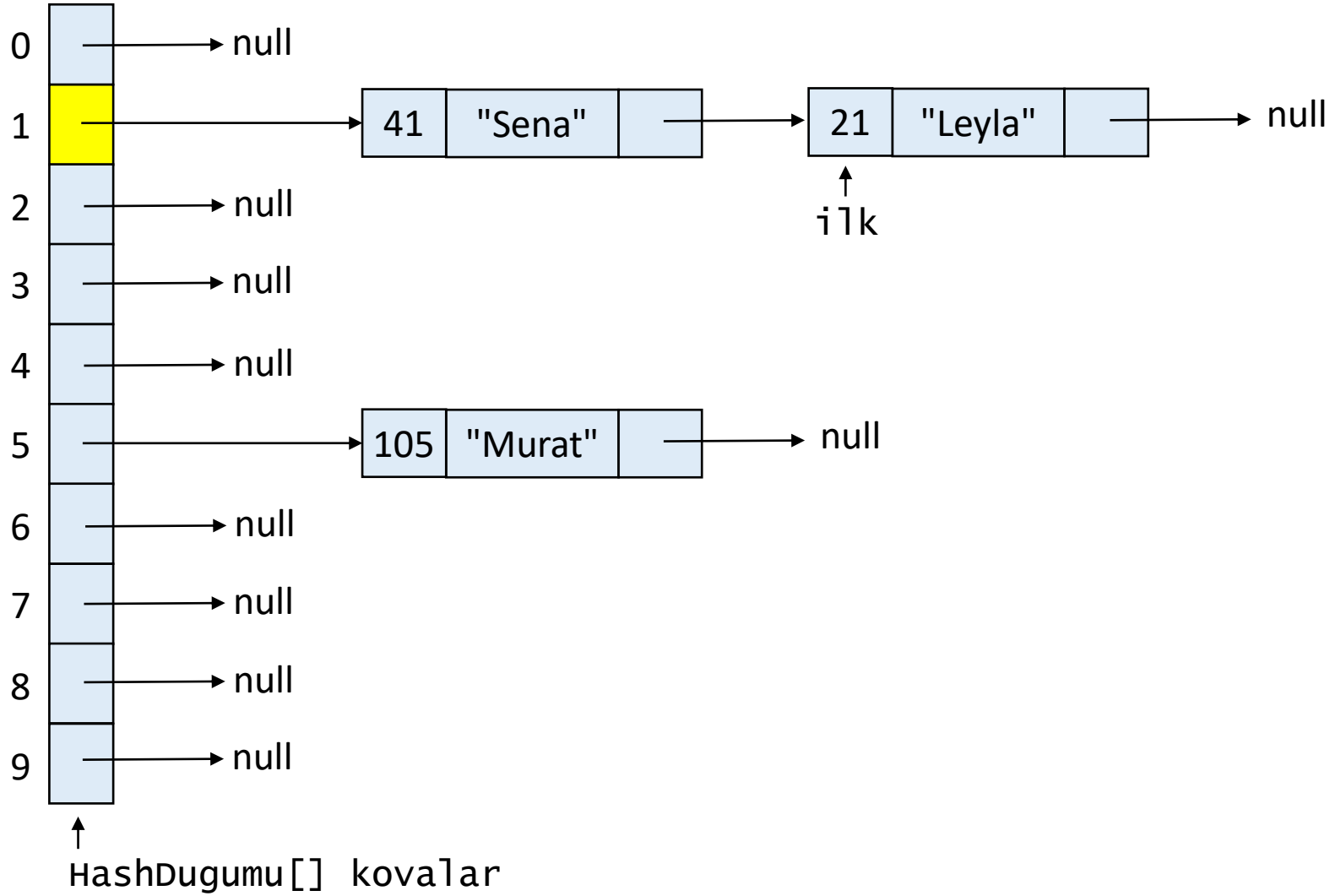
kovaSayisi = 10
buyukluk = 3
anahtar = 21
deger = "Ali"
kovaIndeksi = 1

```
tablo.yerlestir(21,"Ali");
```



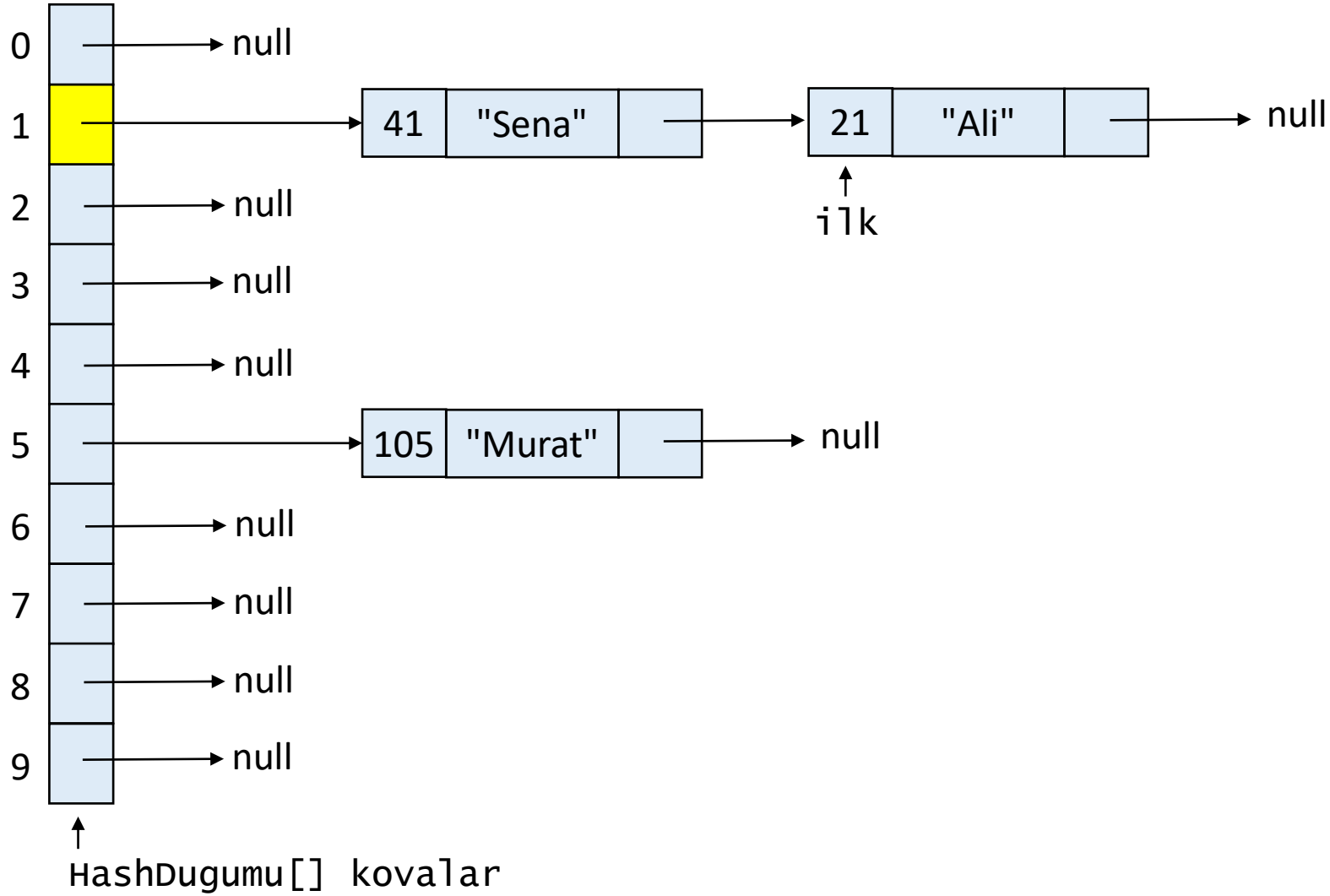
kovaSayisi = 10
buyukluk = 3
anahtar = 21
deger = "Ali"
kovaIndeksi = 1

```
tablo.yerlestir(21,"Ali");
```



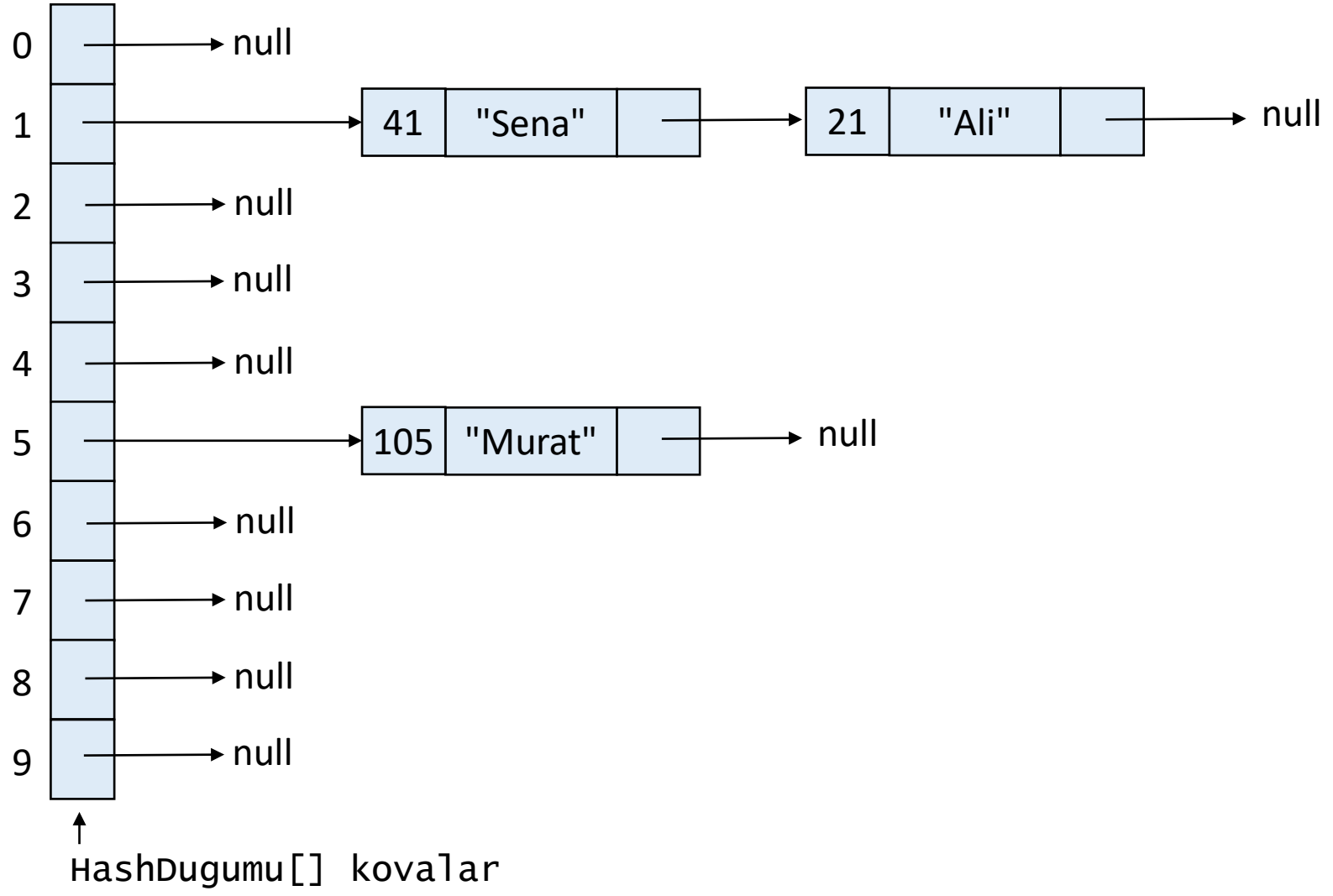
kovaSayisi = 10
buyukluk = 3
anahtar = 21
deger = "Ali"
kovaIndeksi = 1

```
tablo.yerlestir(21, "Ali");
```



kovaSayisi = 10
buyukluk = 3
anahtar = 21
deger = "Ali"
kovaIndeksi = 1

```
tablo.yerlestir(21,"Ali");
```

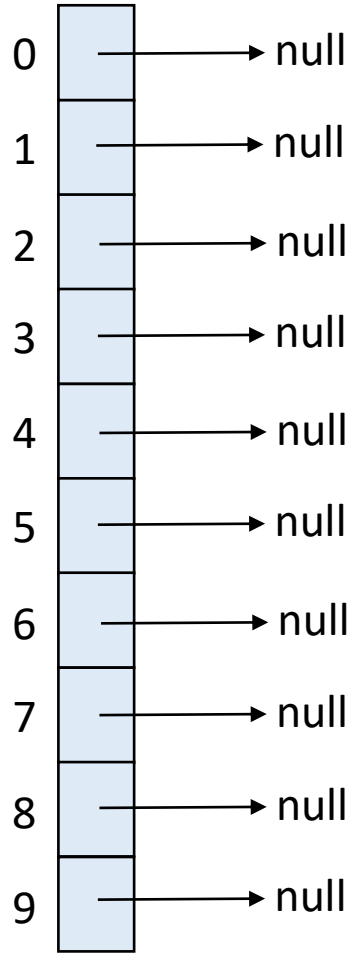


kovaSayisi = 10
buyukluk = 3

Hash Tablosuna Anahtar - Değer İkilisi Yerleştirme



```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

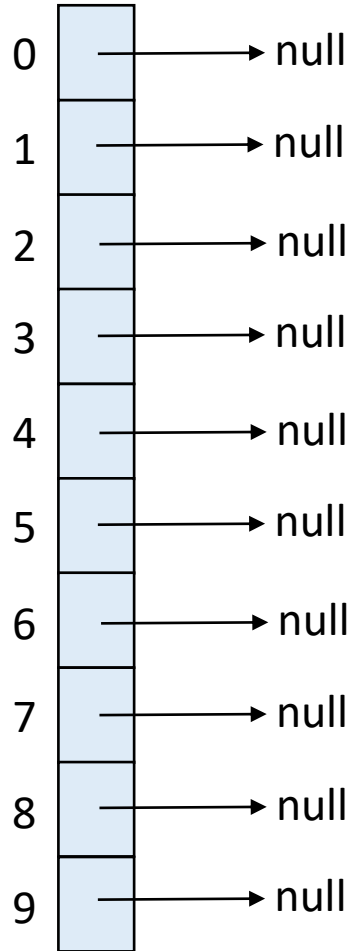


↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 0

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

```
HashTablosu tablo = new HashTablosu(10);
```

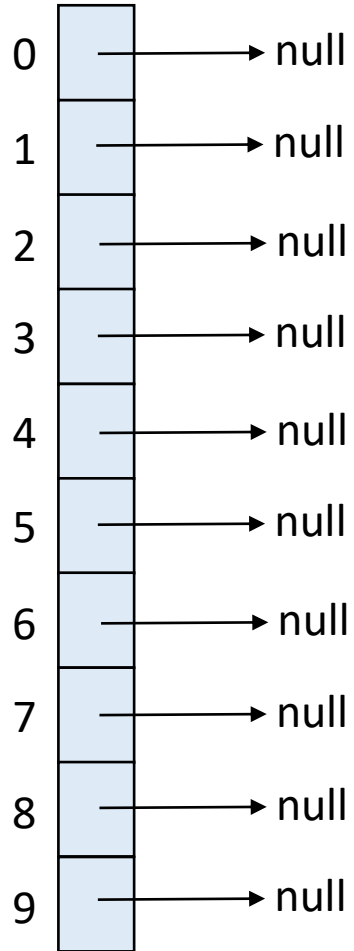


↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 0

```
→ public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

tablo.yerlestir(105,"Murat");

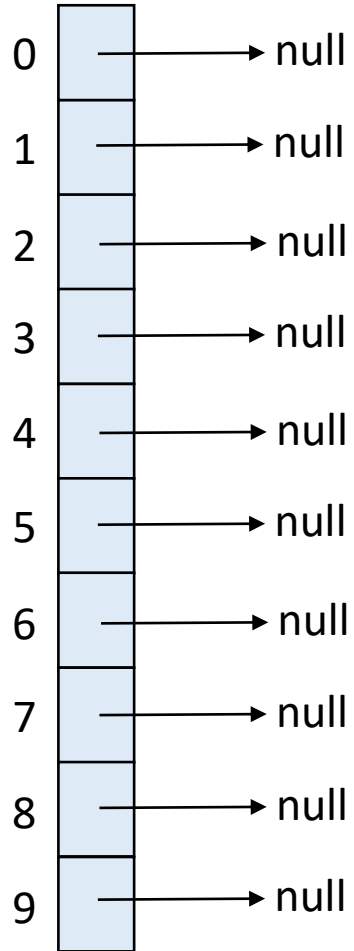


↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"

```
→ public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

tablo.yerlestir(105,"Murat");



↑
HashDugumu[] kovalar

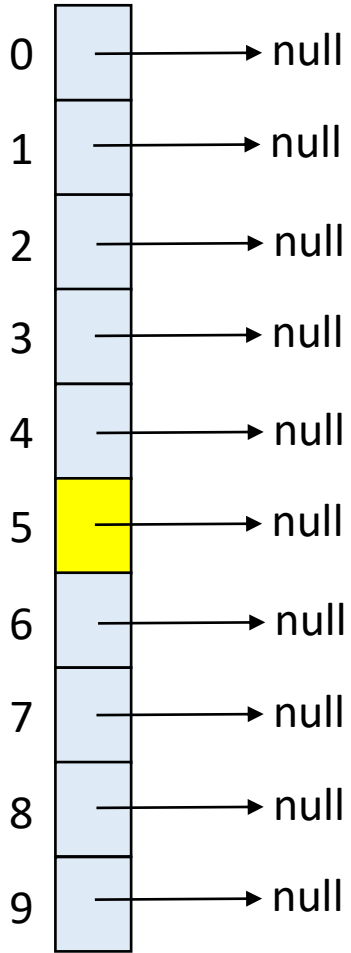
```
public int getKovaIndeksi(Integer anahtar) {  
    return anahtar % kovalar.length;  
}
```

kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"



```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

tablo.yerlestir(105,"Murat");



↑
HashDugumu[] kovalar

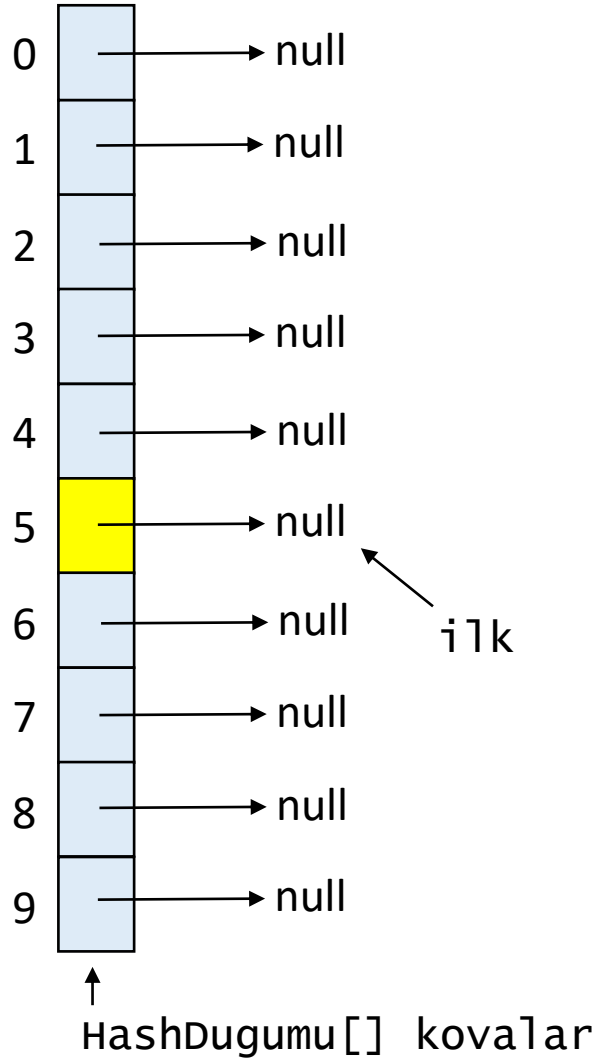
```
public int getKovaIndeksi(Integer anahtar) {  
    return anahtar % kovalar.length;  
}
```

kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"
kovaIndeksi = 5



```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

tablo.yerlestir(105,"Murat");

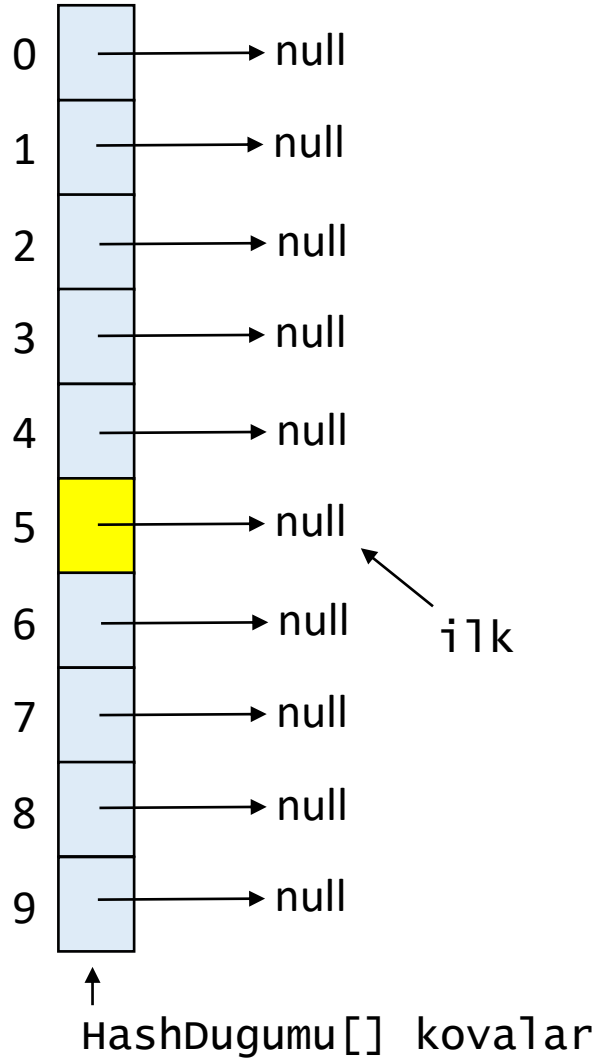


kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"
kovaIndeksi = 5



```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

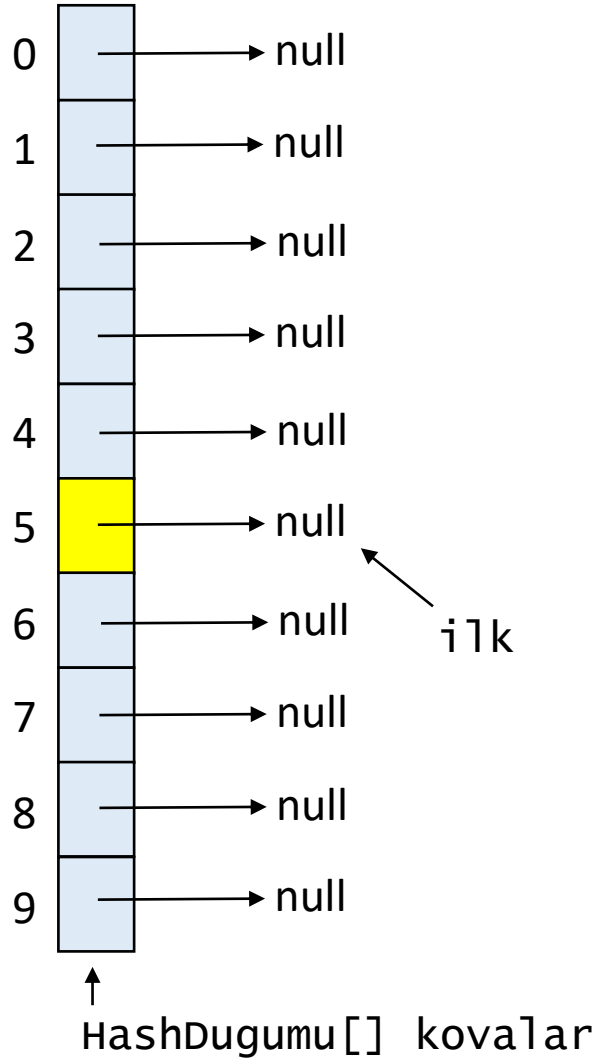
tablo.yerlestir(105,"Murat");



kovaSayisi = 10
buyukluk = 0
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

tablo.yerlestir(105,"Murat");

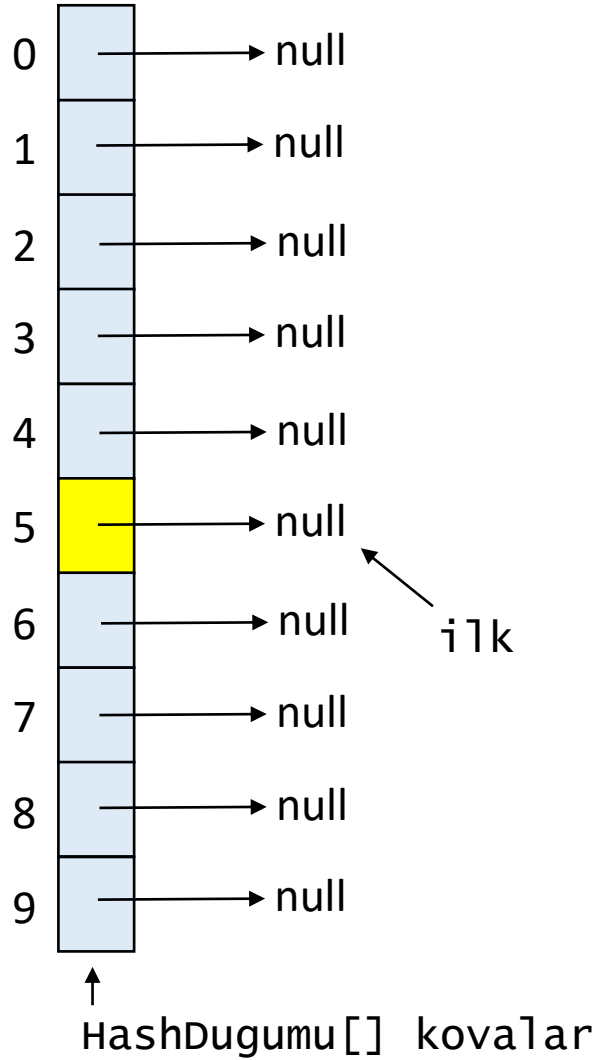


kovaSayisi = 10
buyukluk = 1
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```



tablo.yerlestir(105,"Murat");

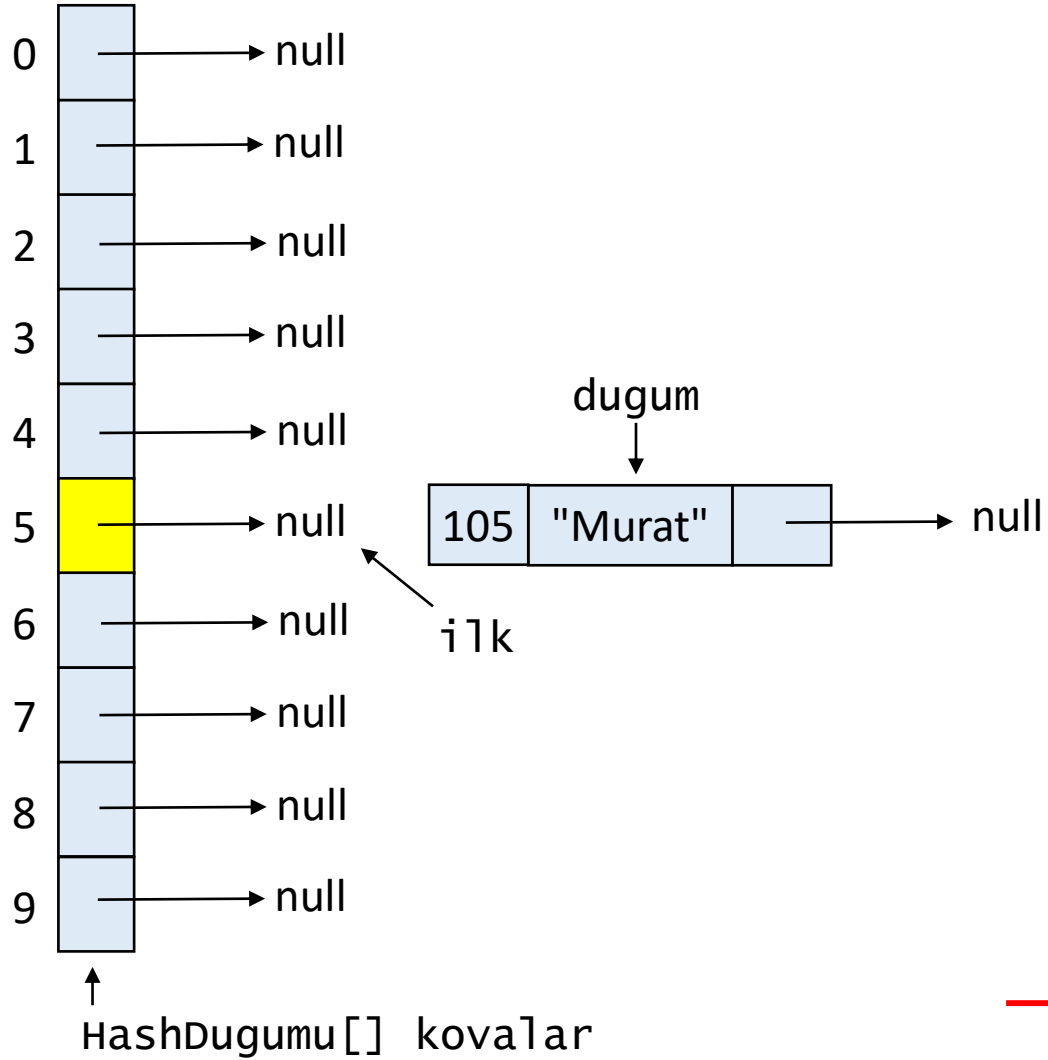


kovaSayisi = 10
buyukluk = 1
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```



tablo.yerlestir(105,"Murat");

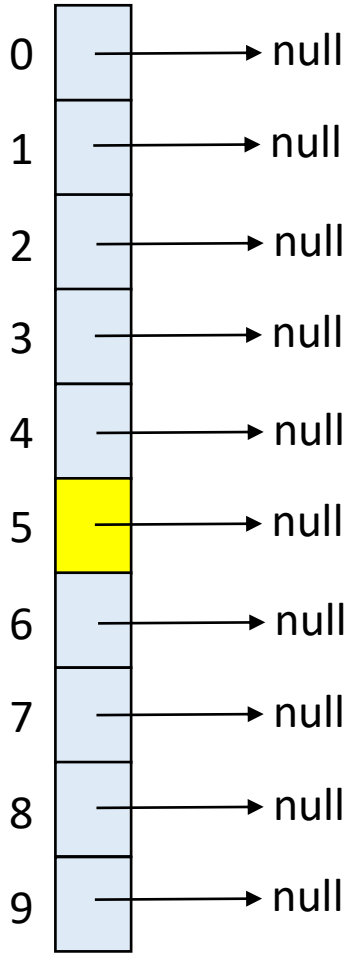


kovaSayisi = 10
 buyukluk = 1
 anahtar = 105
 deger = "Murat"
 kovaIndeksi = 5

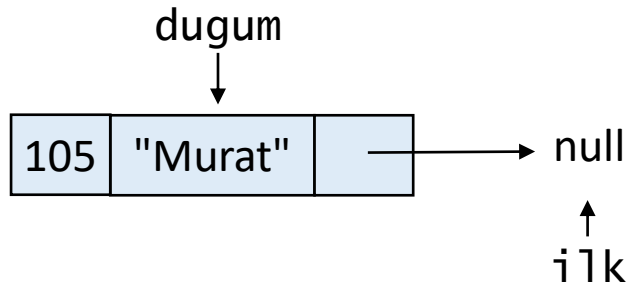
```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```



tablo.yerlestir(105,"Murat");



↑ HashDugumu[] kovalar

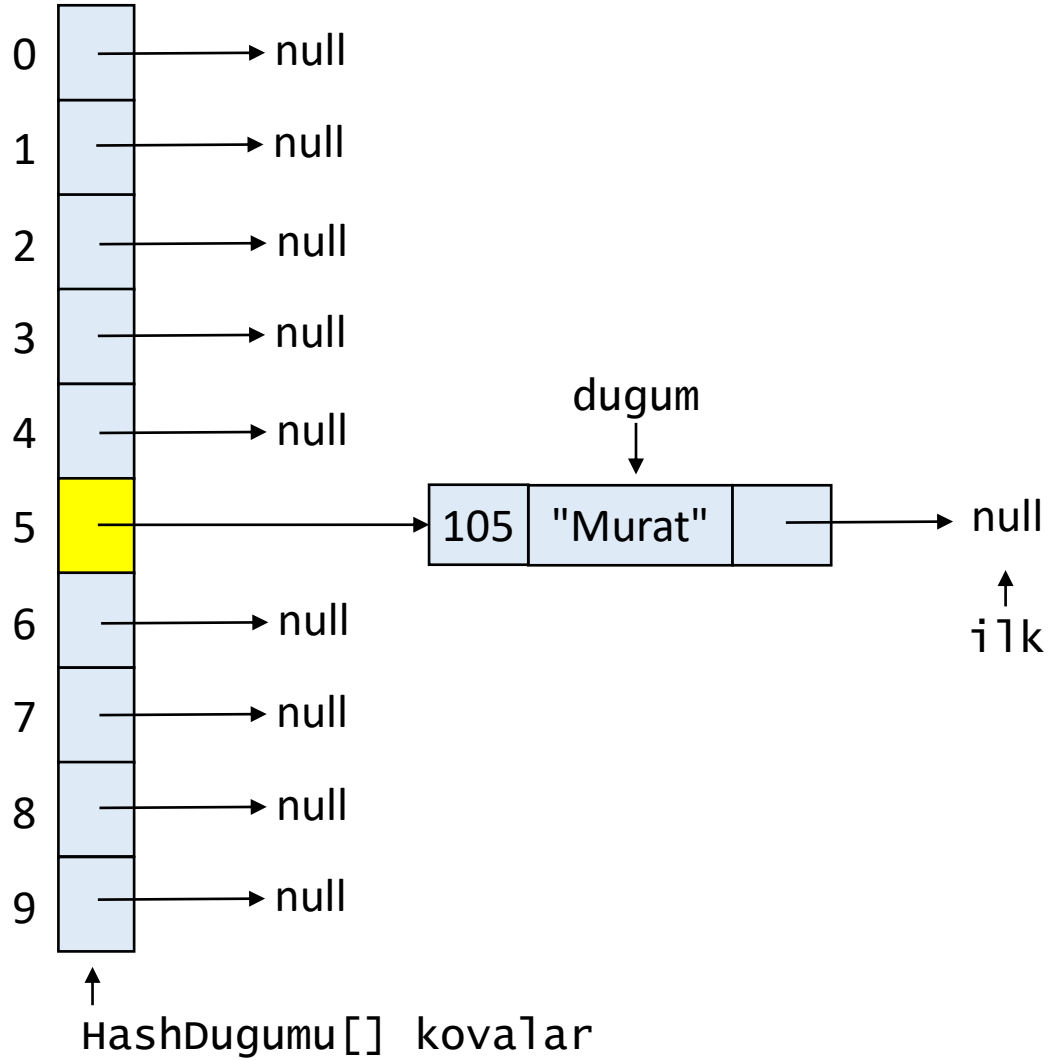


kovaSayisi = 10
buyukluk = 1
anahtar = 105
deger = "Murat"
kovaIndeksi = 5

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```



tablo.yerlestir(105,"Murat");

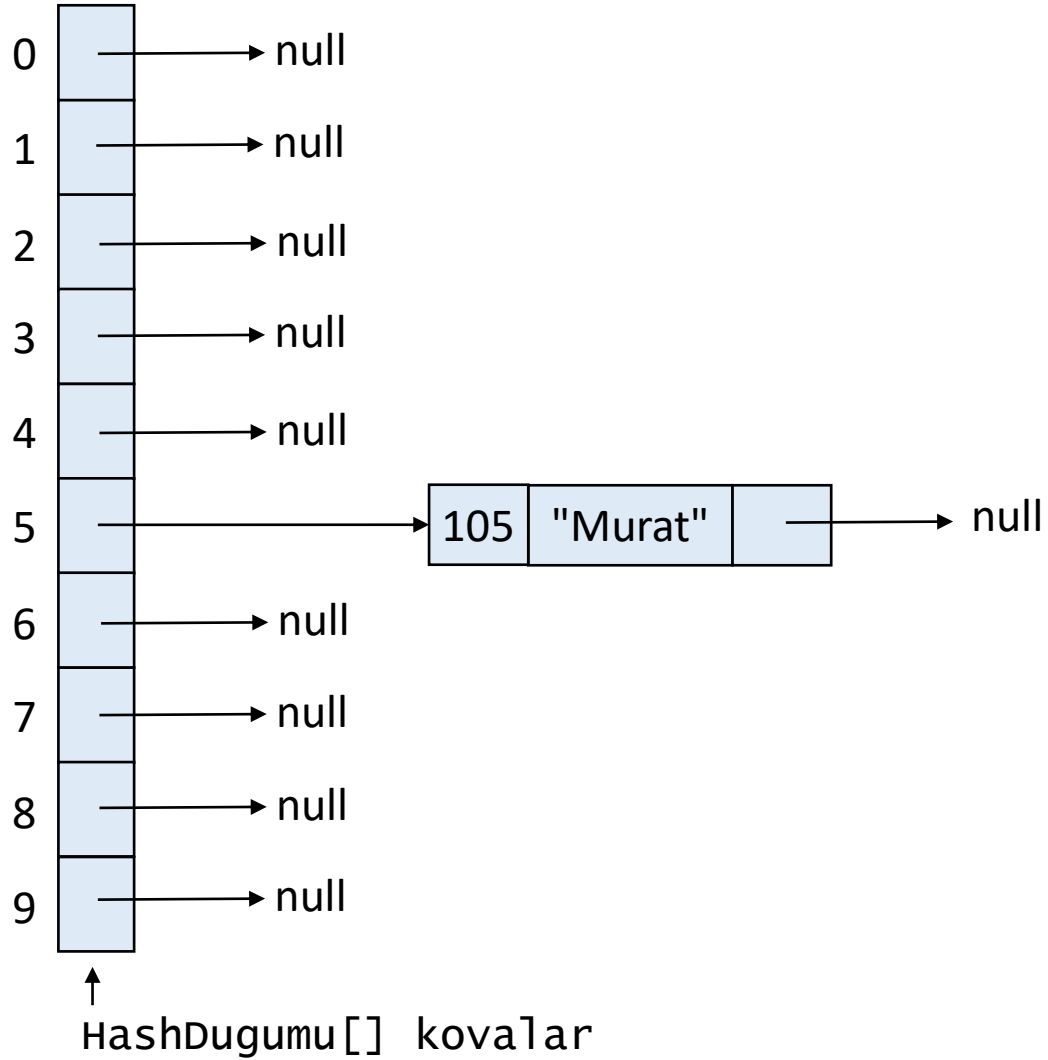


kovaSayisi = 10
 buyukluk = 1
 anahtar = 105
 deger = "Murat"
 kovaIndeksi = 5

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

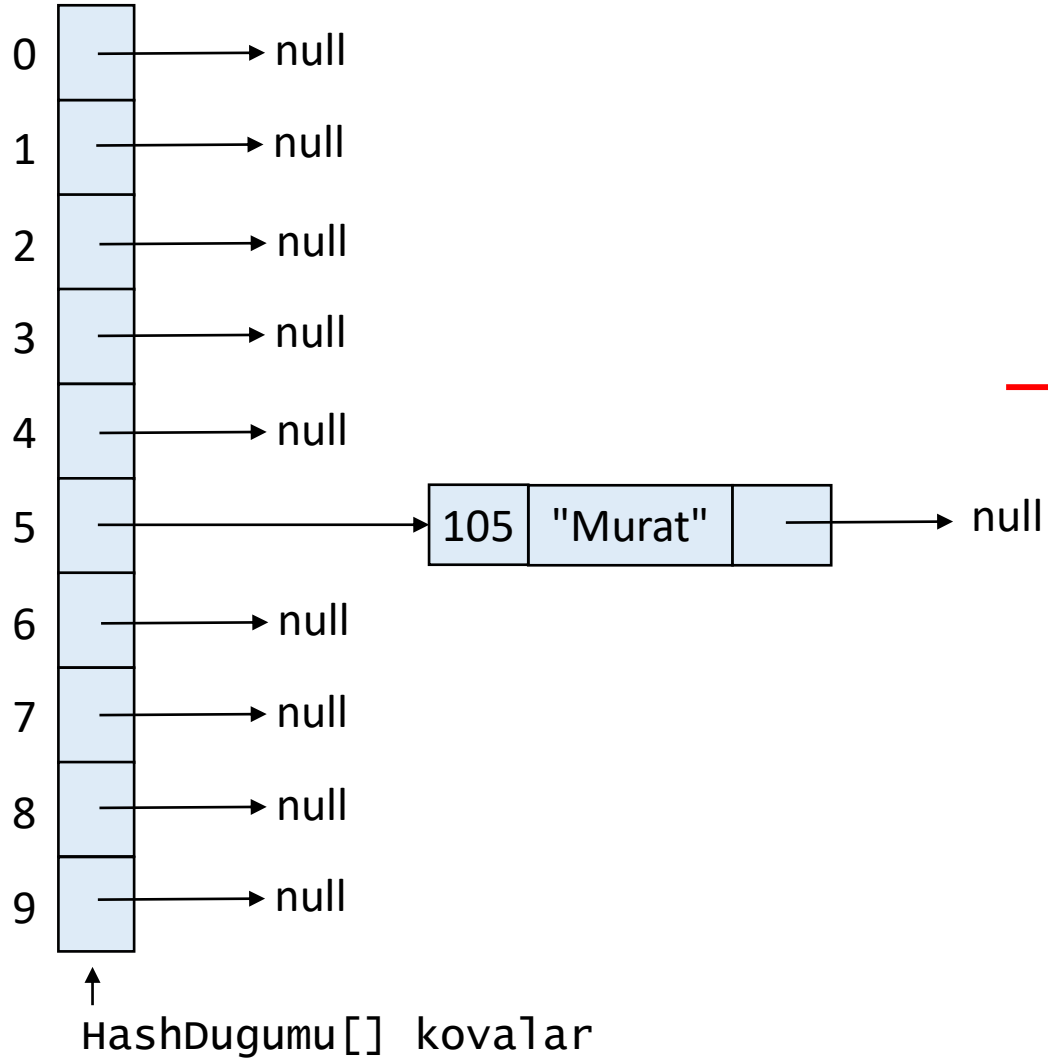


tablo.yerlestir(105,"Murat");



kovaSayisi = 10
buyukluk = 1

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```



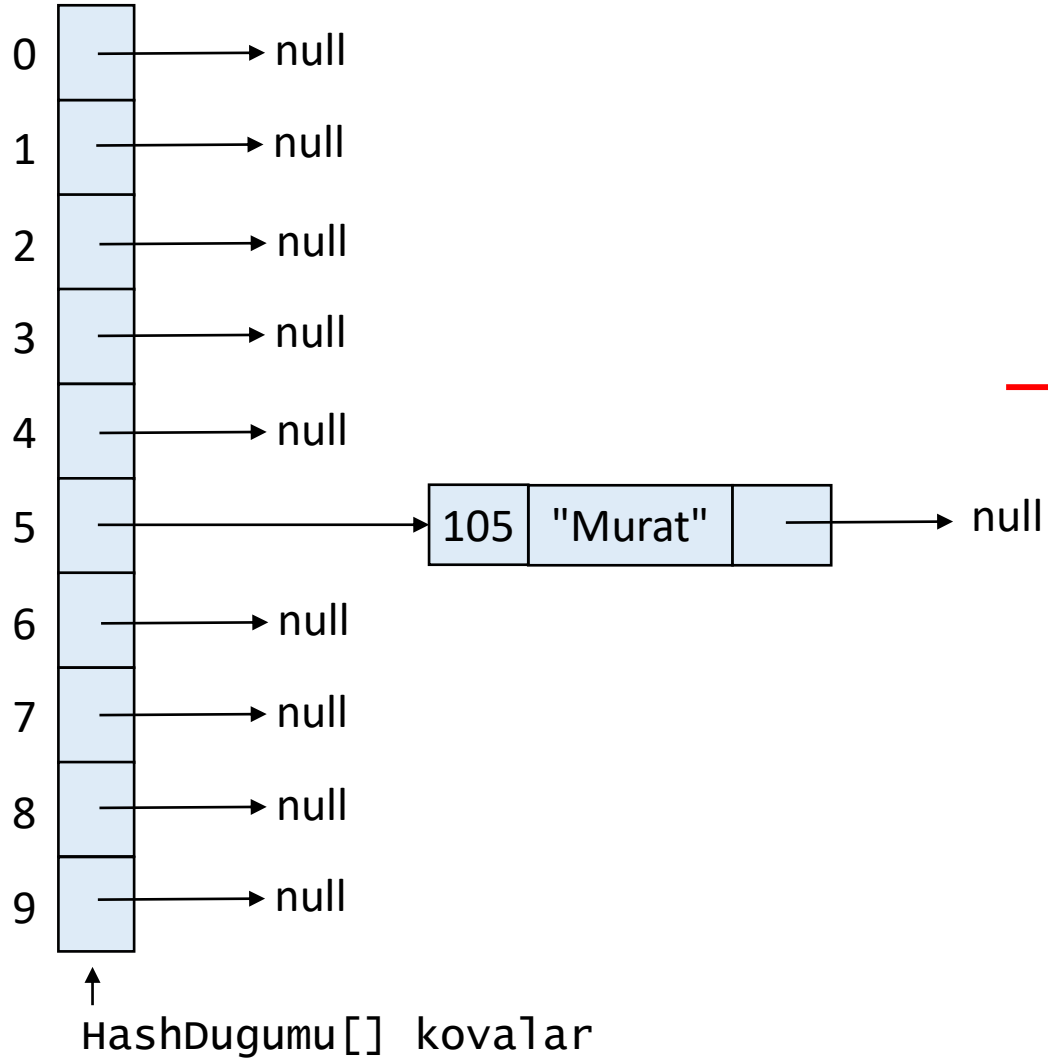
kovaSayisi = 10
buyukluk = 1

```

→ public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}

```

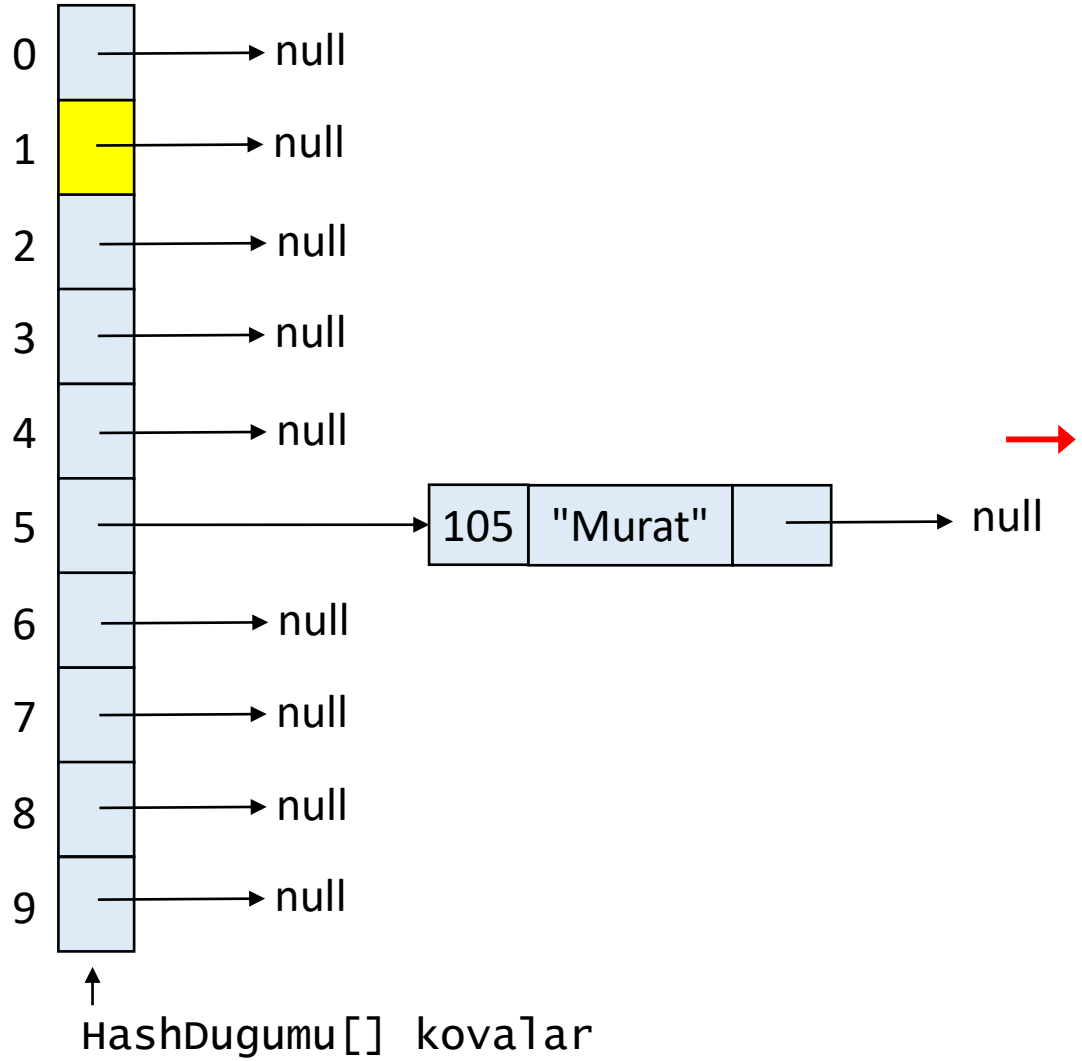
tablo.yerlestir(21,"Leyla");



kovaSayisi = 10
buyukluk = 1
anahtar = 21
deger = "Leyla"

```
→ public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

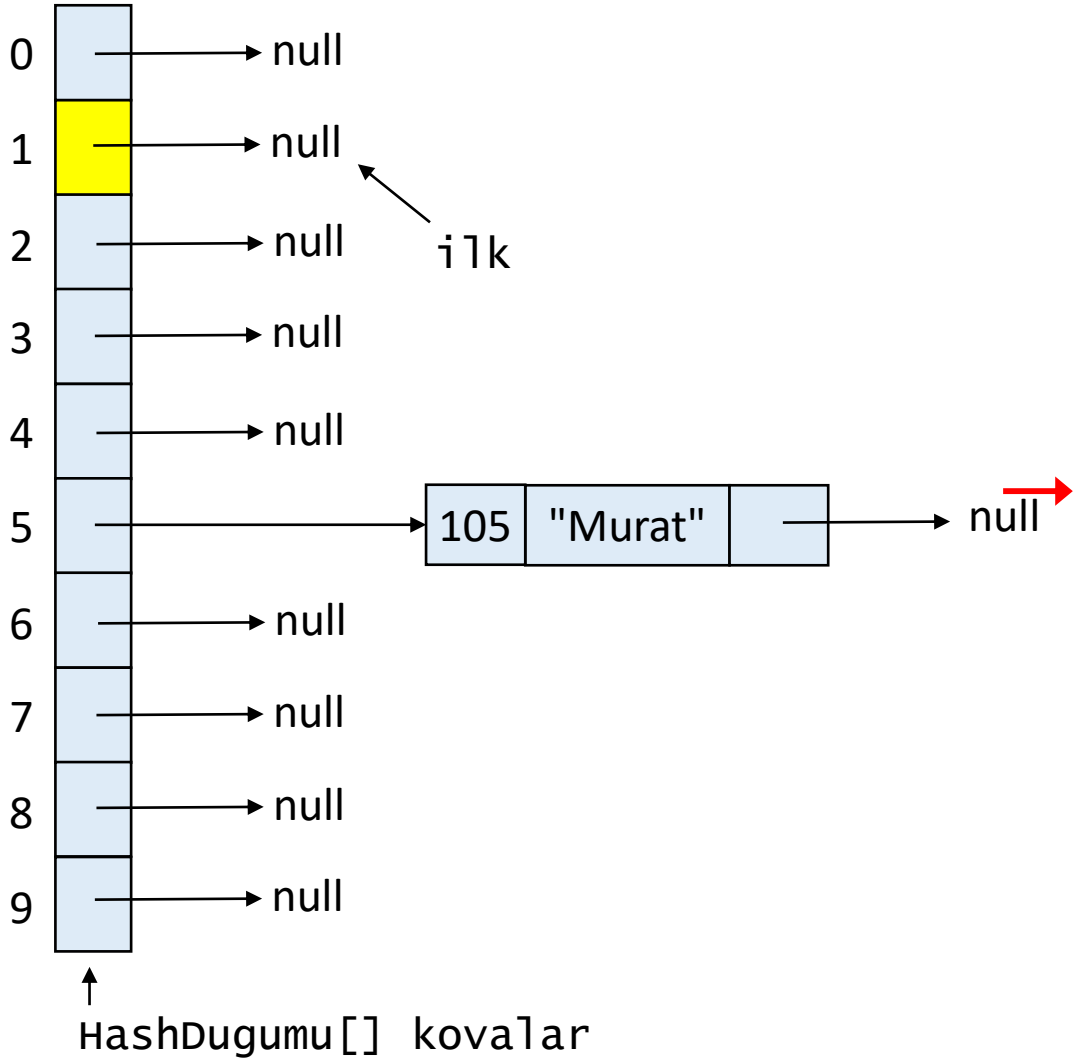
```
tablo.yerlestir(21,"Leyla");
```



kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

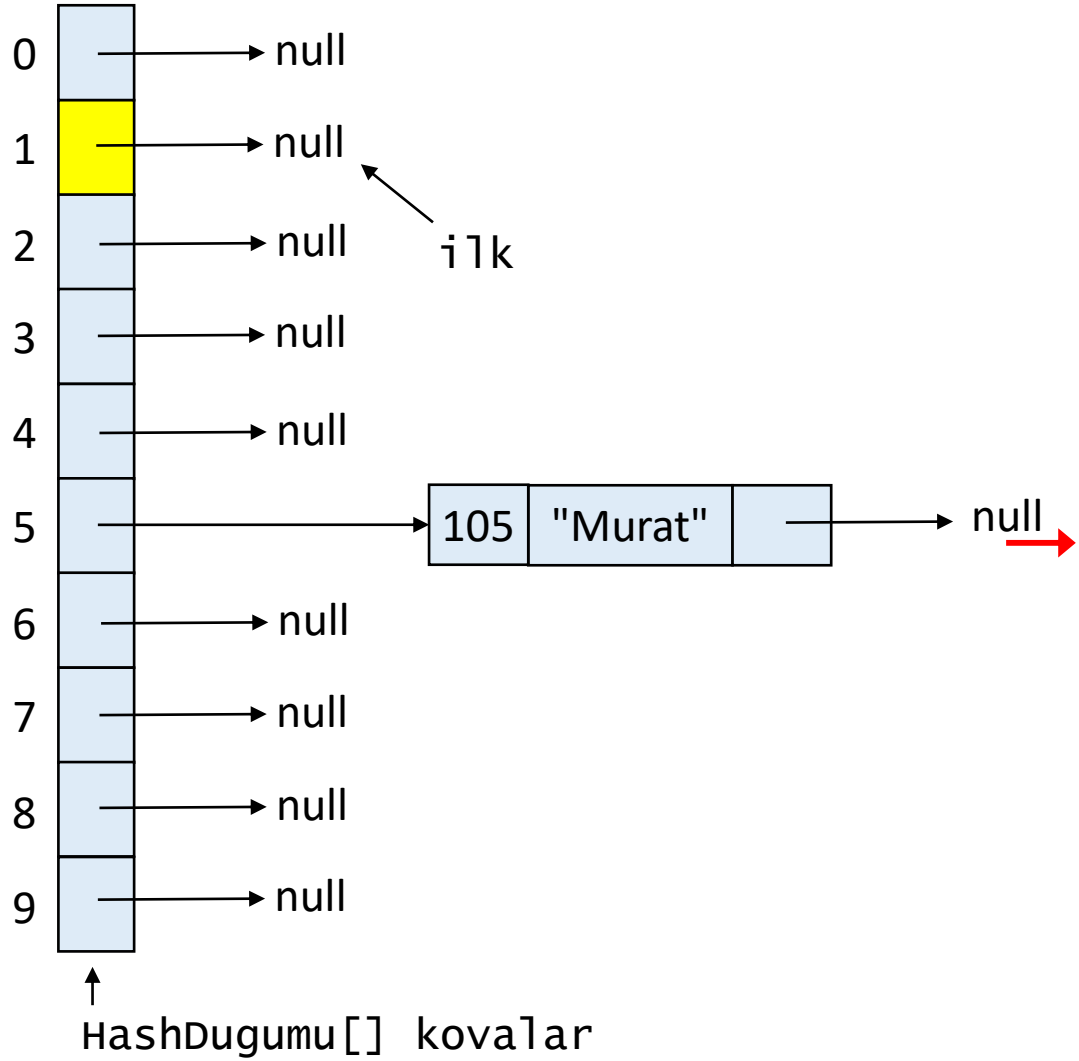
tablo.yerlestir(21,"Leyla");



kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

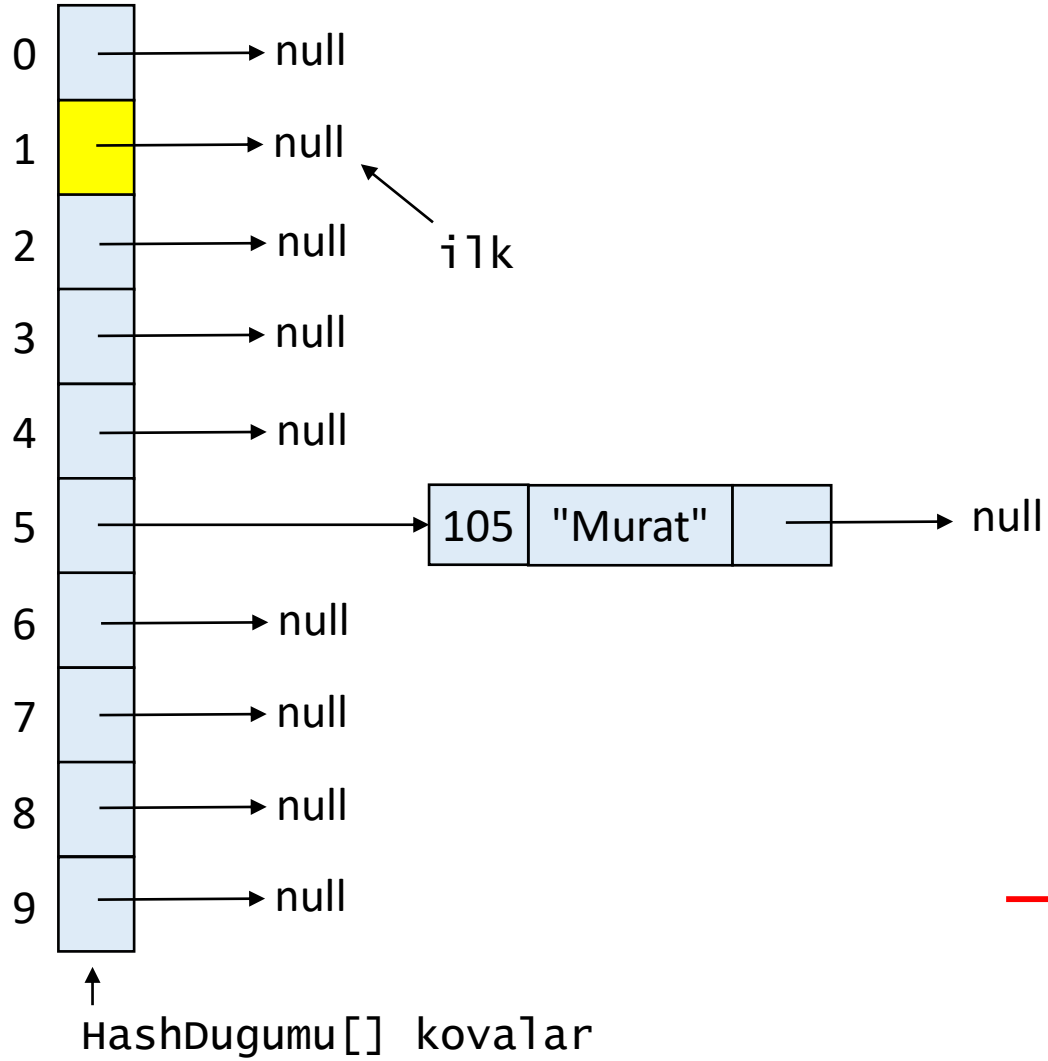
tablo.yerlestir(21,"Leyla");



kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

tablo.yerlestir(21,"Leyla");

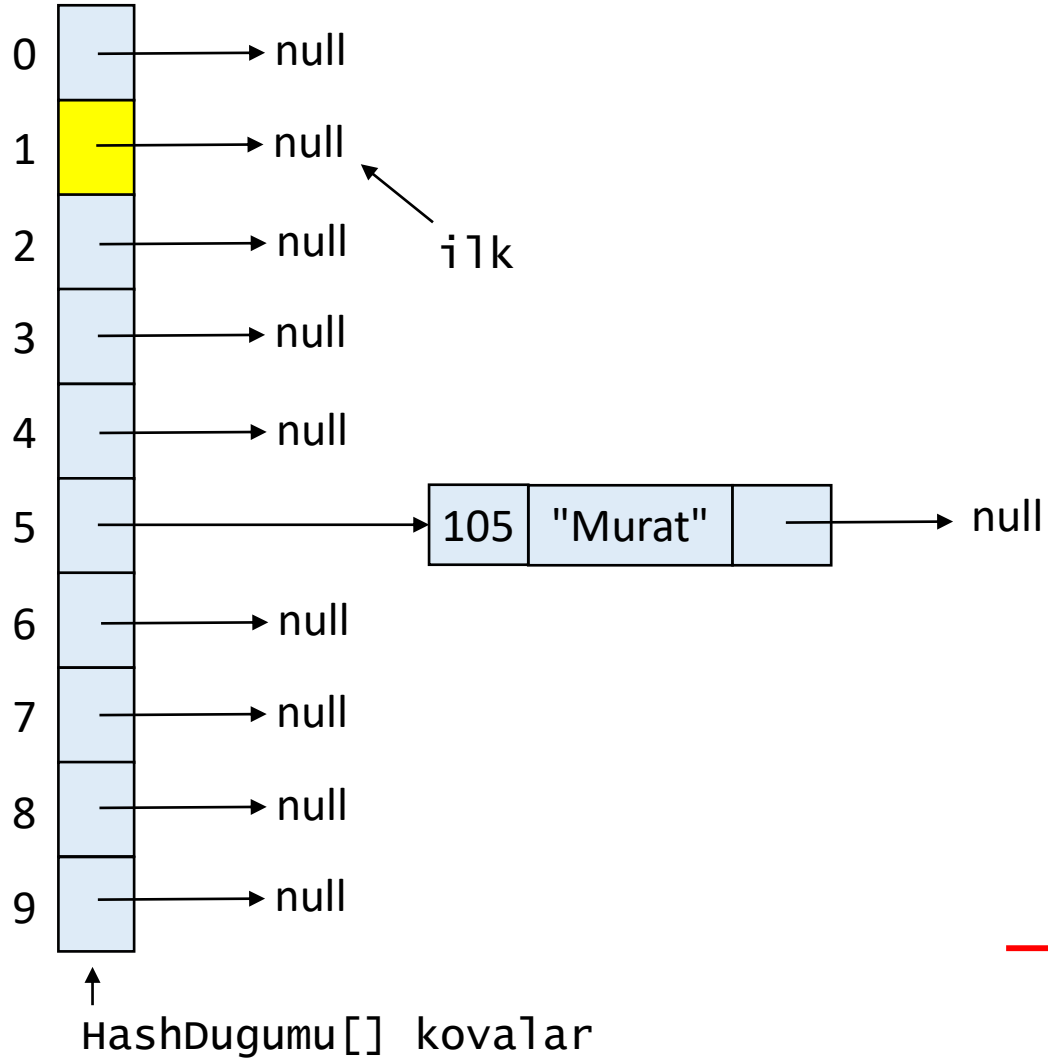


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```



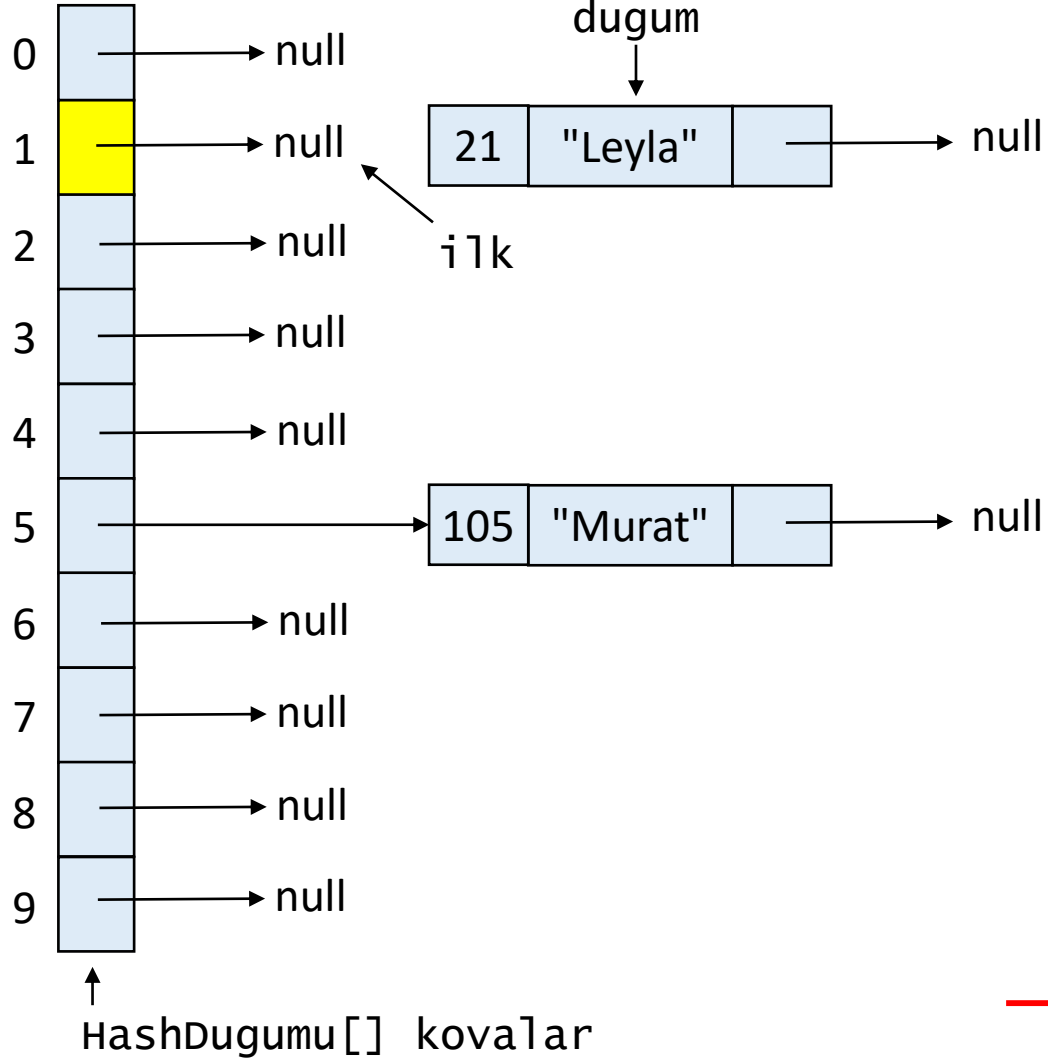
tablo.yerlestir(21,"Leyla");



kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

tablo.yerlestir(21,"Leyla");

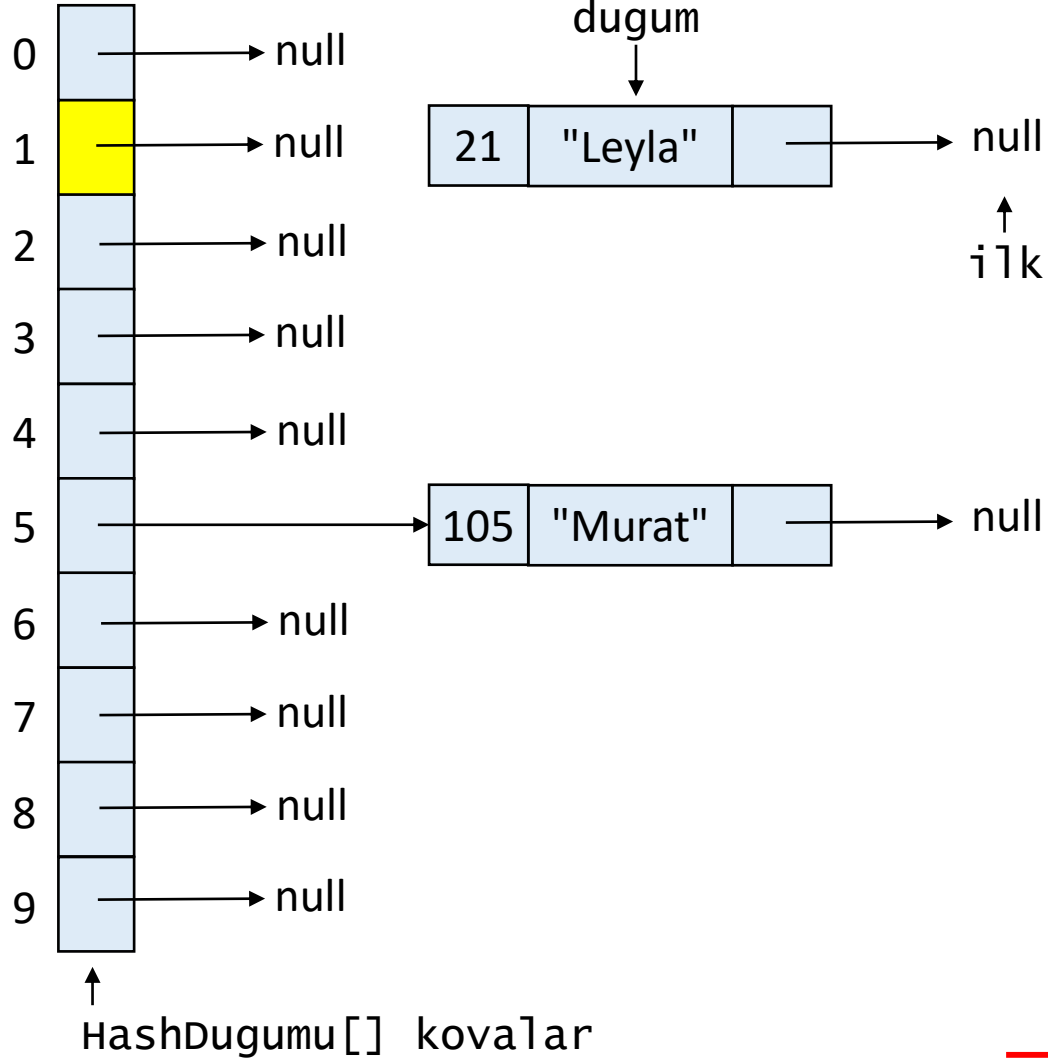


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```



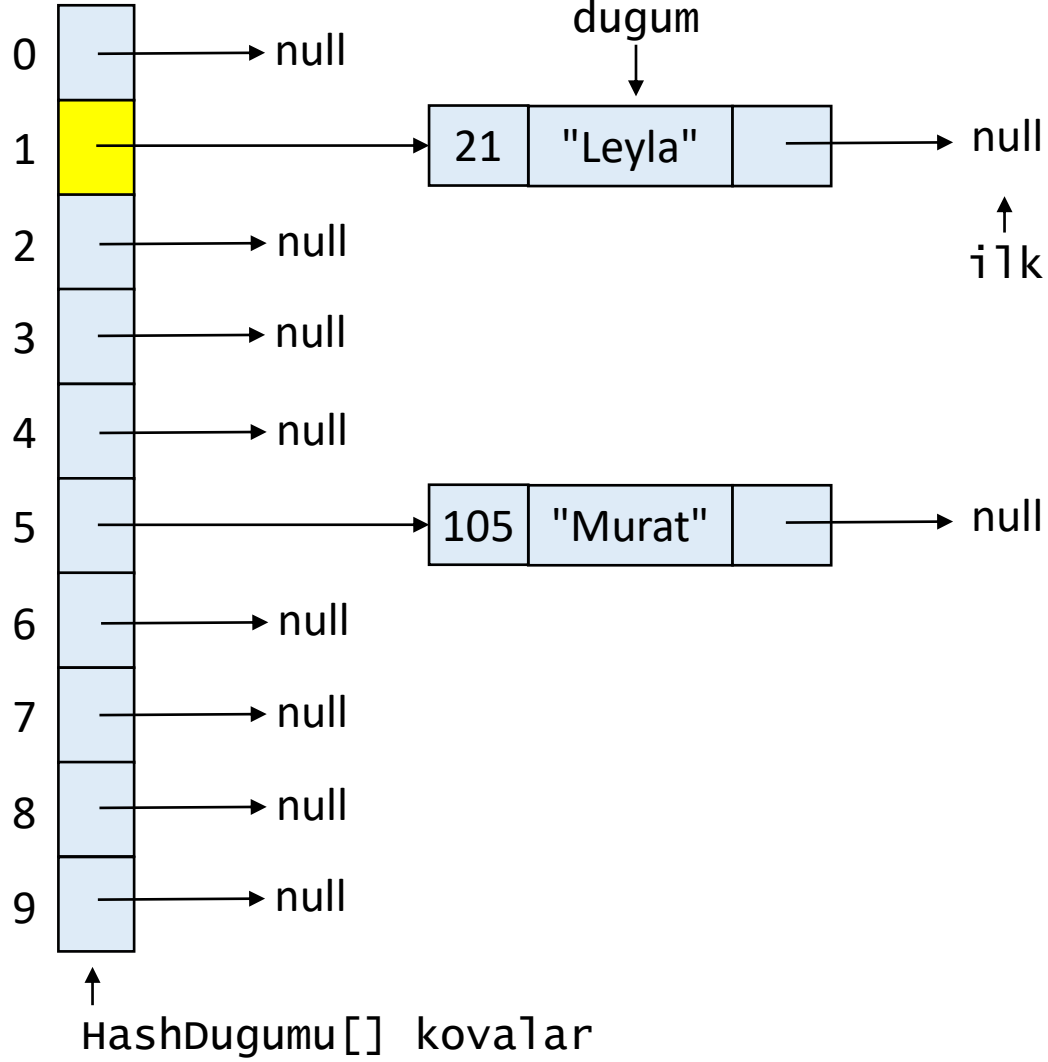
tablo.yerlestir(21,"Leyla");



kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

tablo.yerlestir(21,"Leyla");

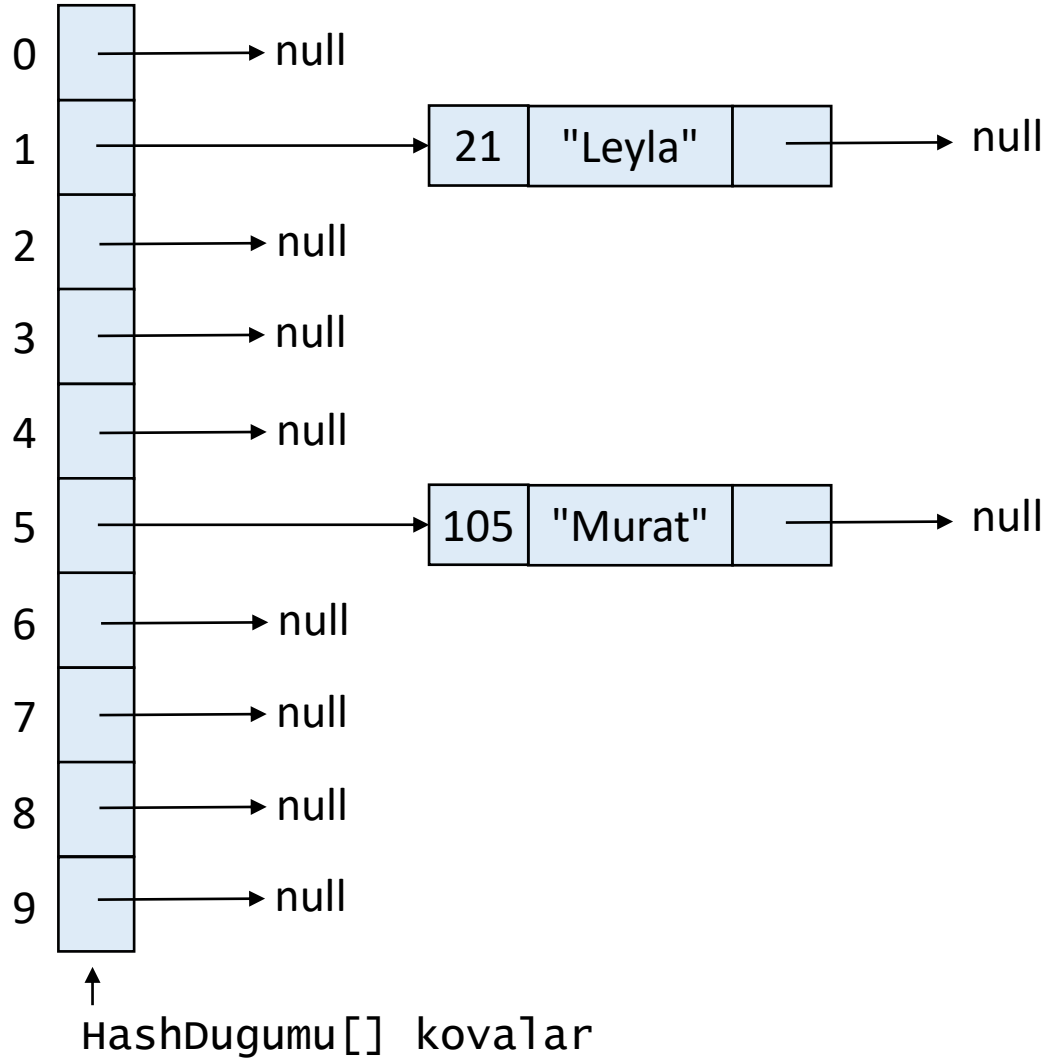


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 deger = "Leyla"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

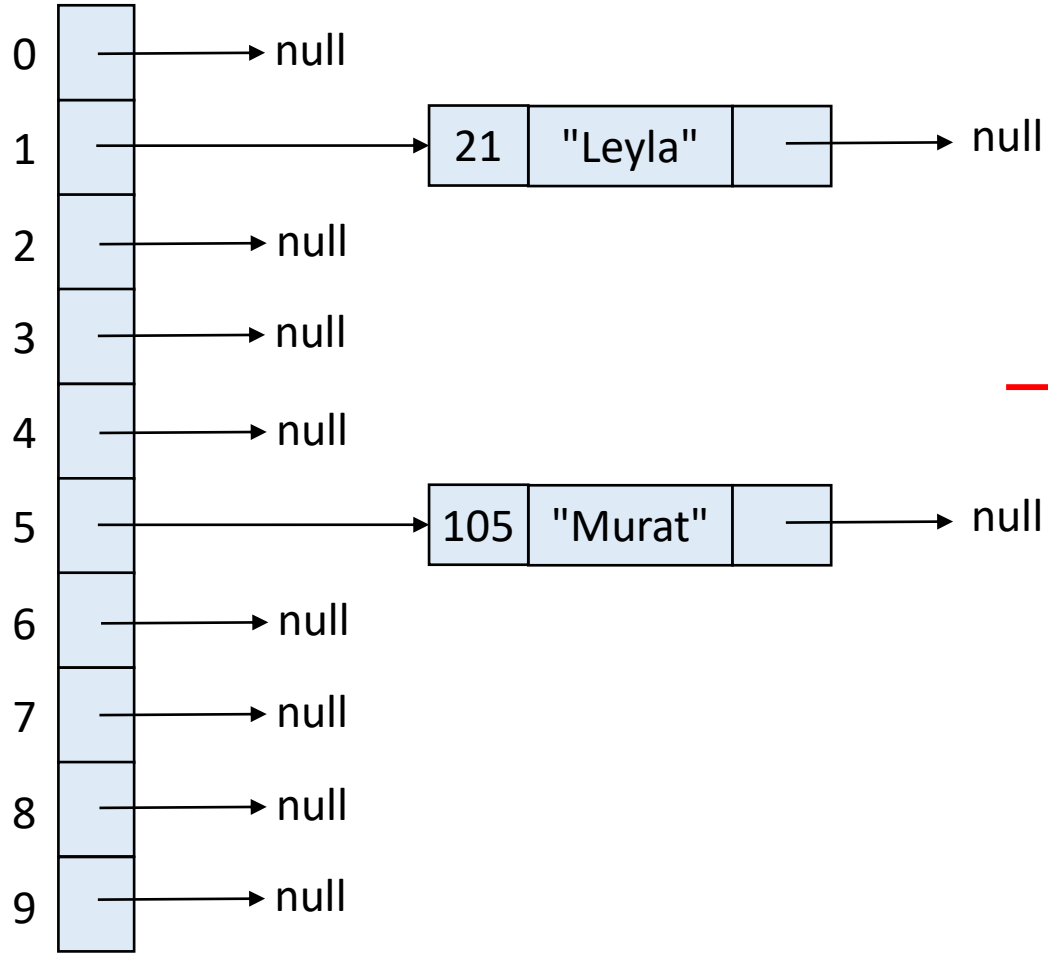


tablo.yerlestir(21,"Leyla");



kovaSayisi = 10
buyukluk = 2

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

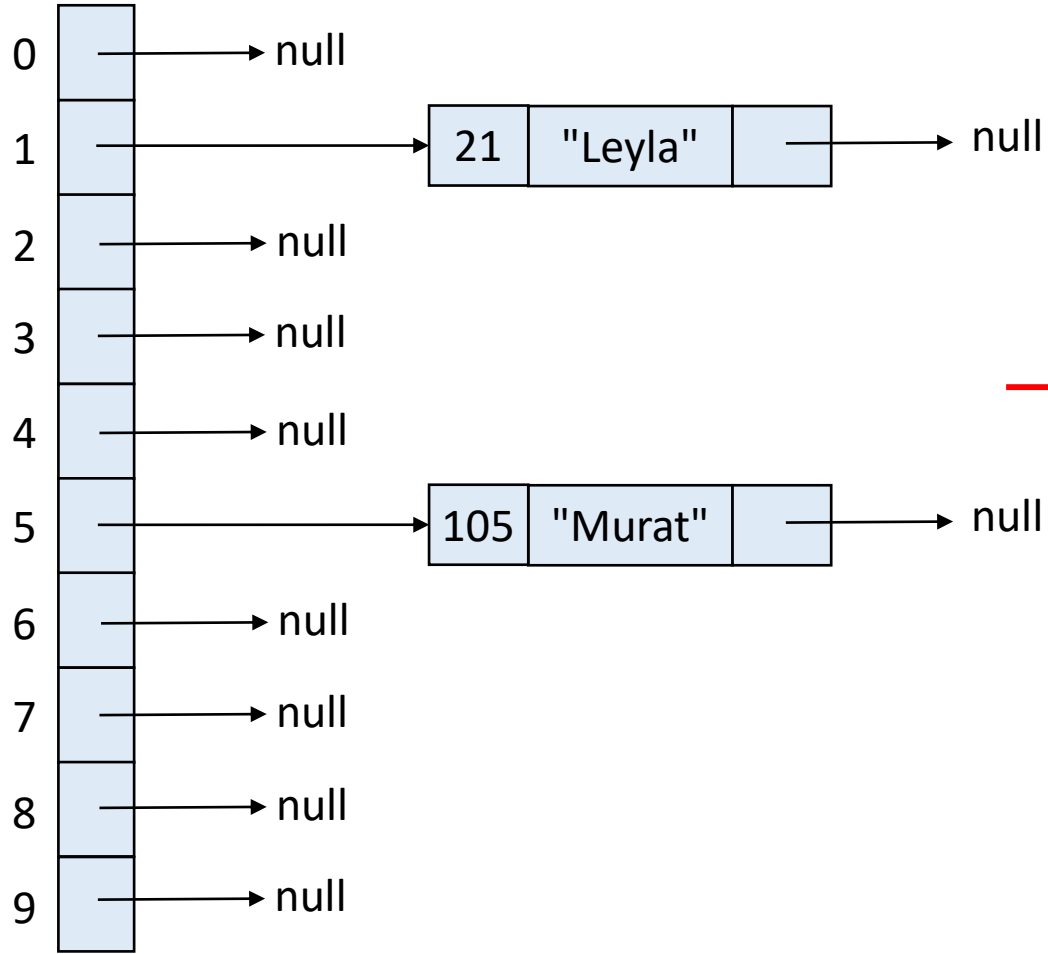


↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 2

```
→ public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

```
tablo.yerlestir(41,"Sena");
```



↑
HashDugumu[] kovalar

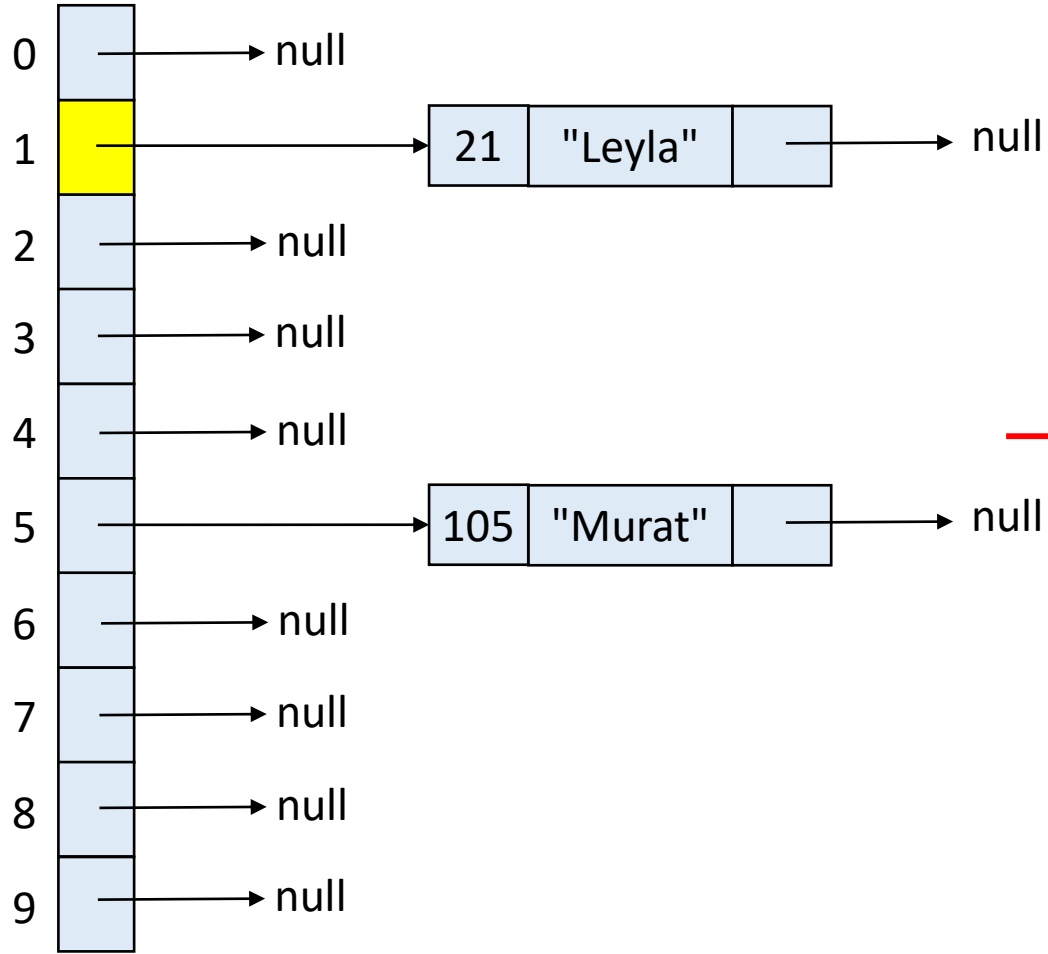
tablo.yerlestir(41,"Sena");

kovaSayisi = 10
buyukluk = 2
anahtar = 41
deger = "Sena"

```

→ public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}

```

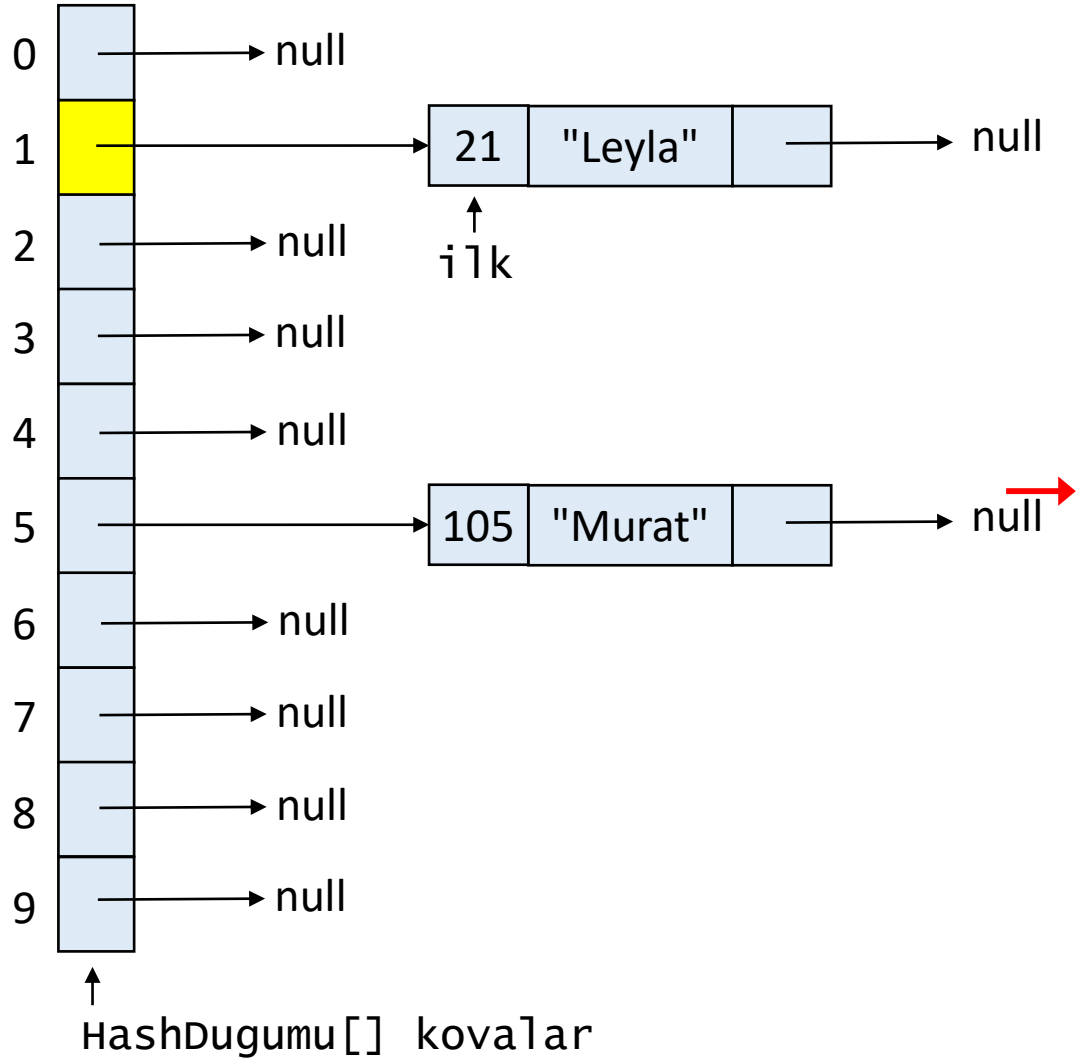



↑ HashDugumu[] kovalar

kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

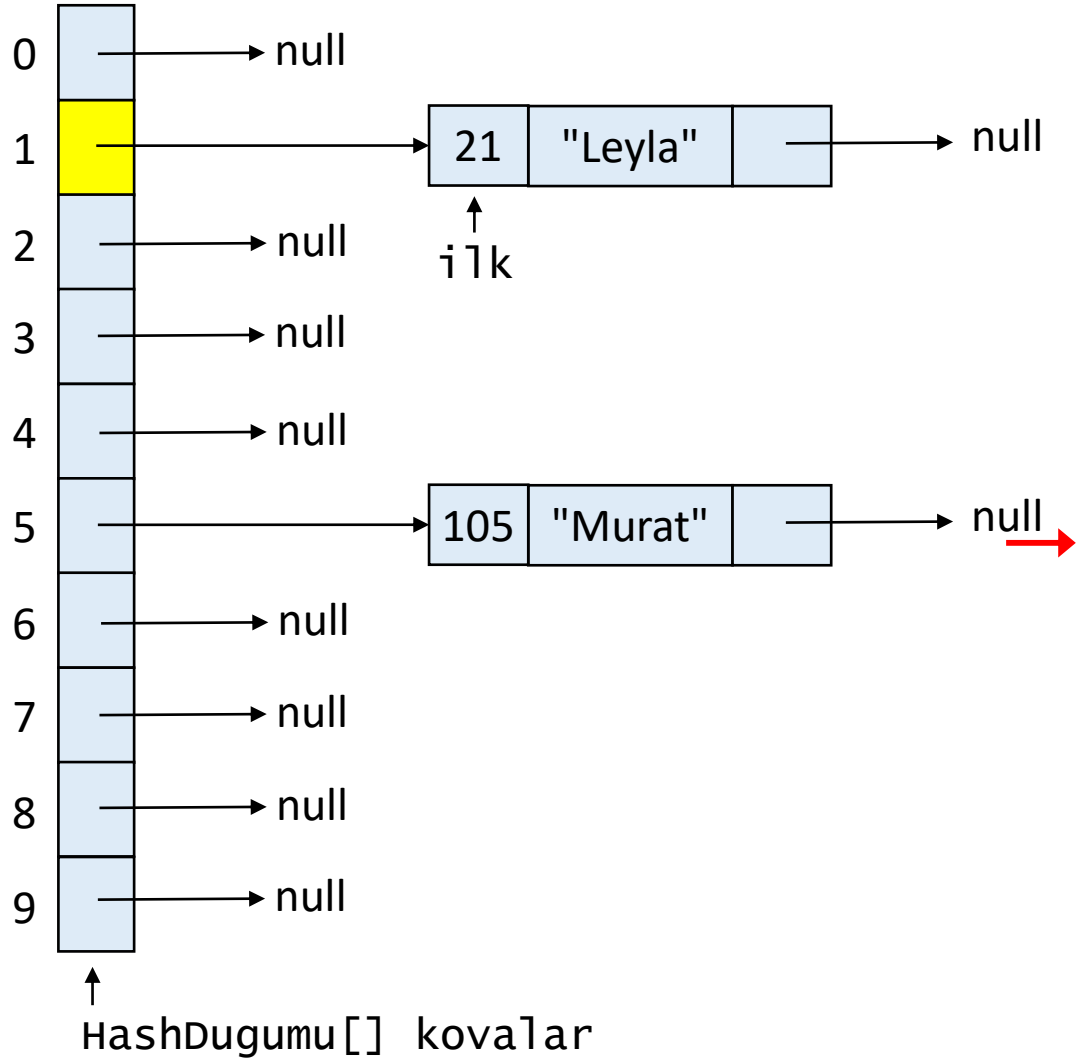
tablo.yerlestir(41,"Sena");



kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

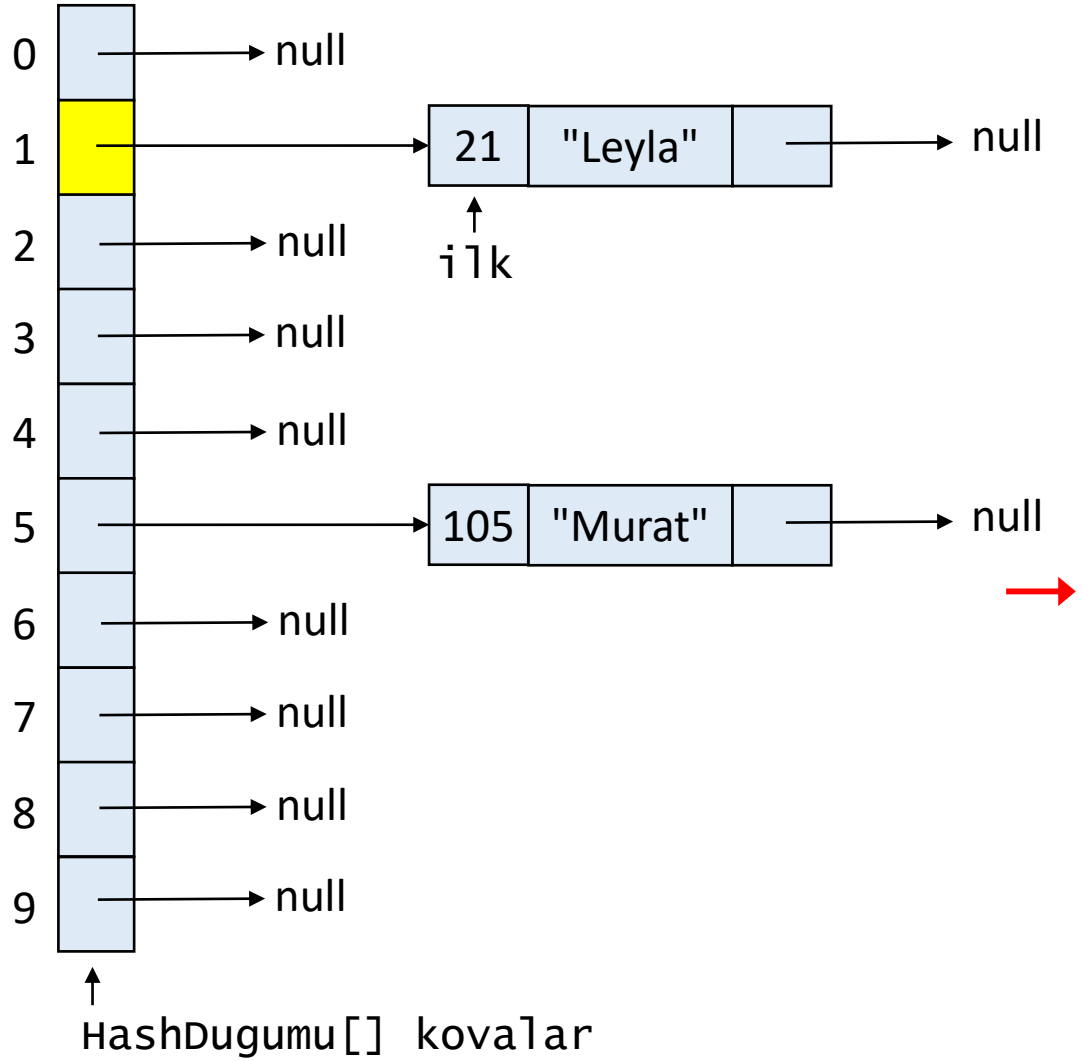
tablo.yerlestir(41,"Sena");



kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

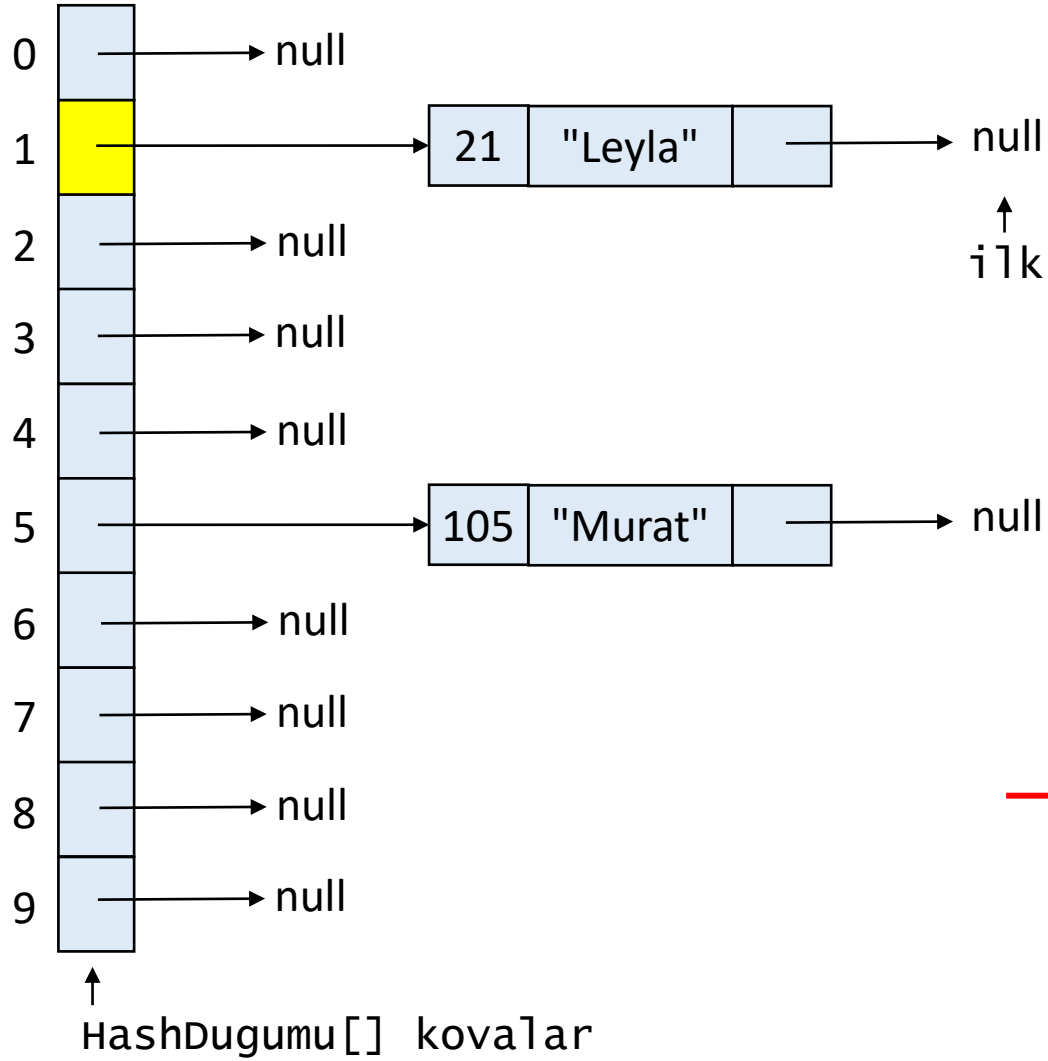
tablo.yerlestir(41,"Sena");



kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 deger = "Sena"
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    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

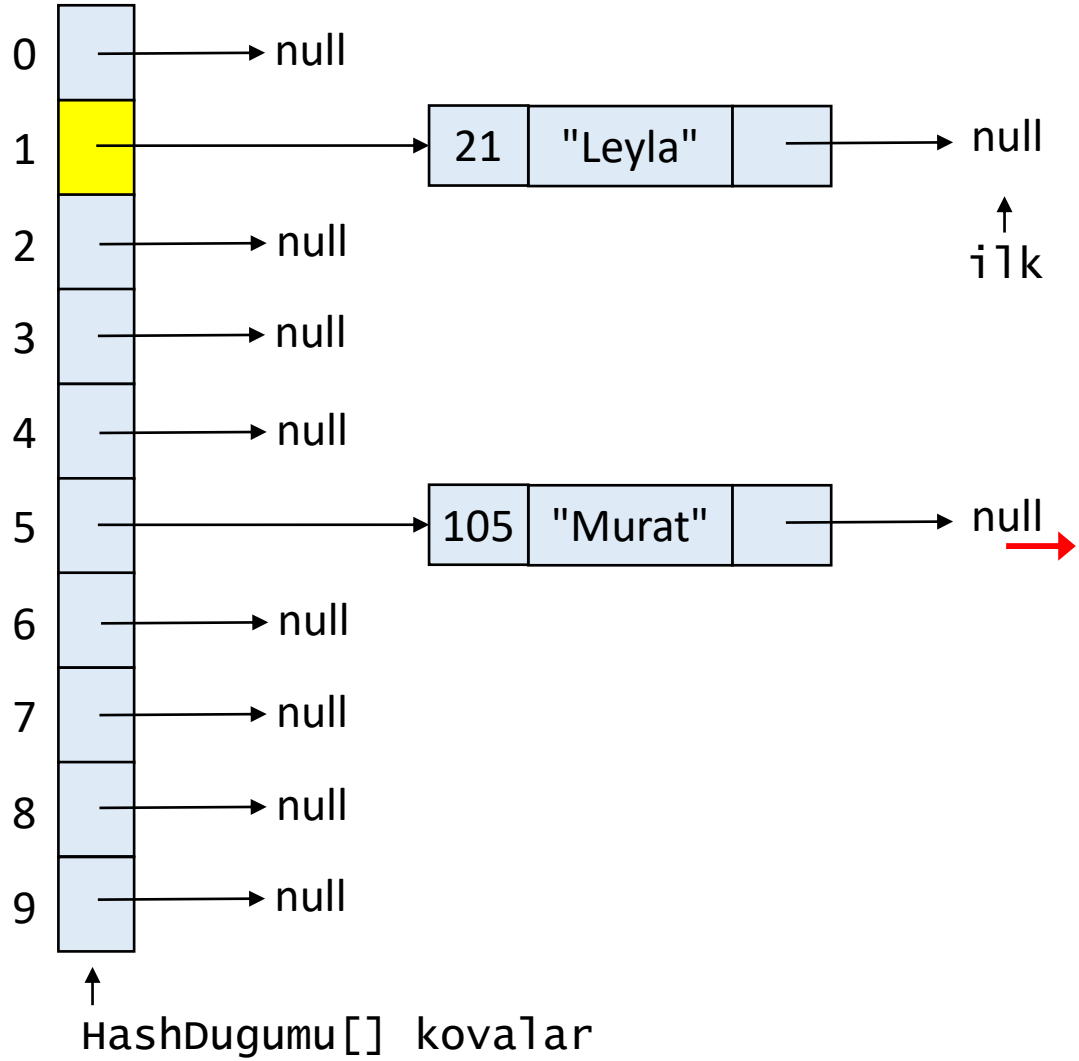
tablo.yerlestir(41,"Sena");



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 buyukluk = 2
 anahtar = 41
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    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
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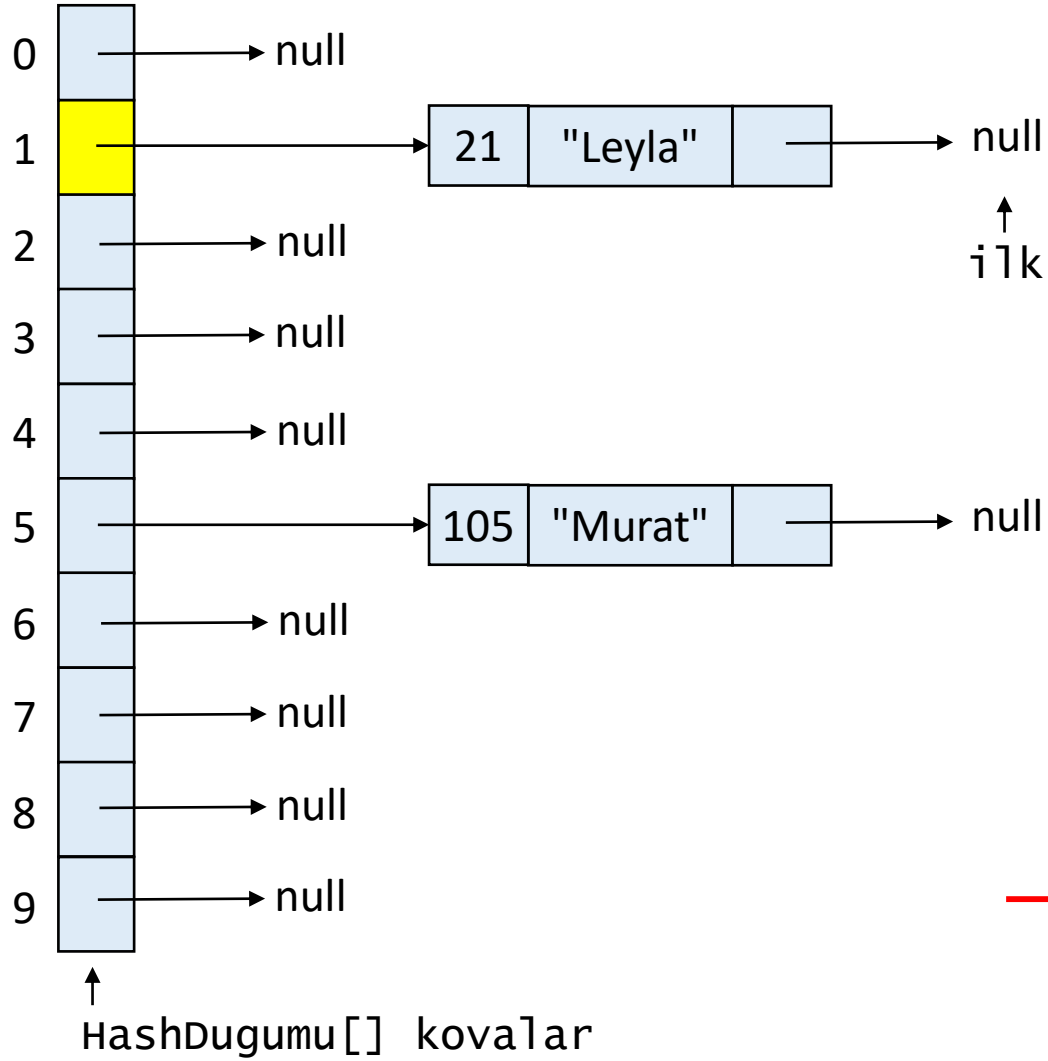
tablo.yerlestir(41,"Sena");



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 buyukluk = 2
 anahtar = 41
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    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
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tablo.yerlestir(41,"Sena");

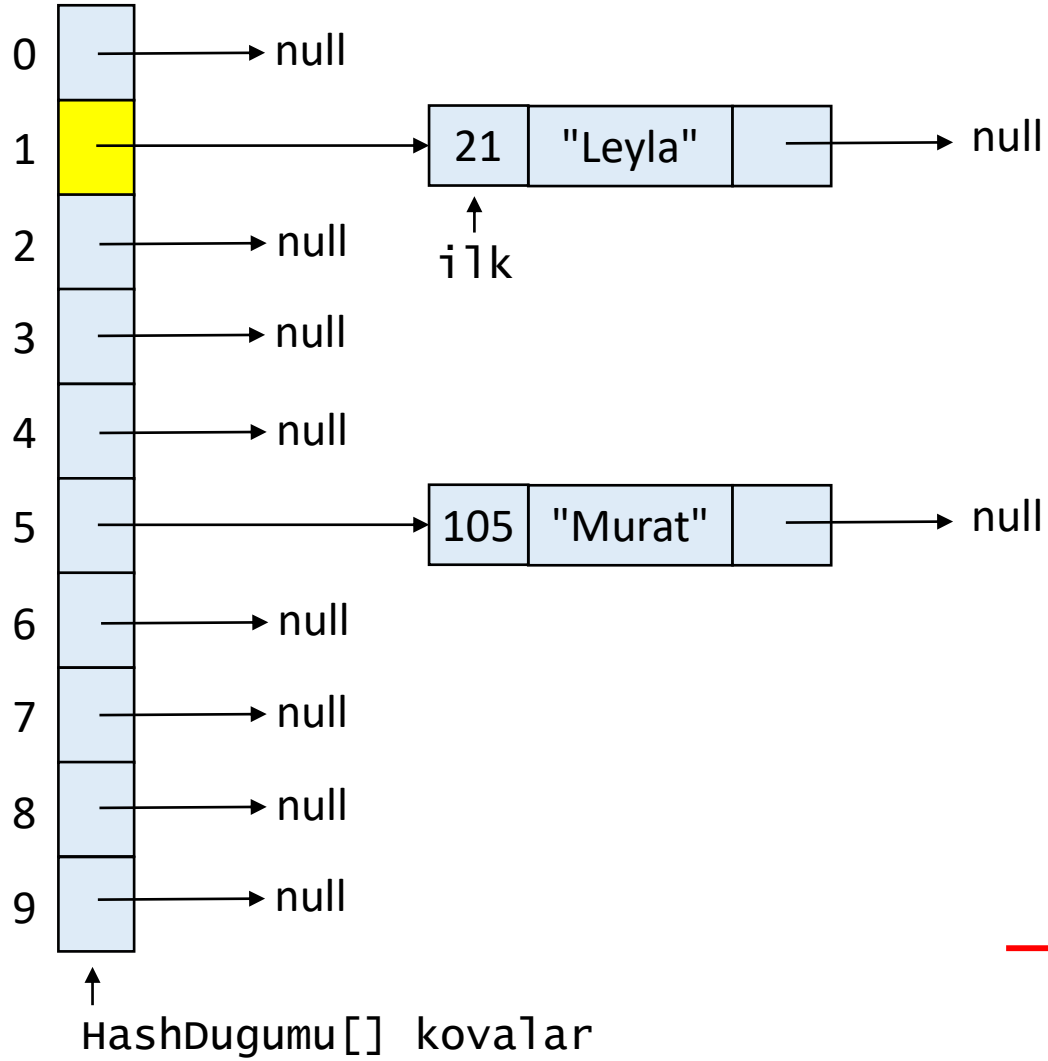


kovaSayisi = 10
 buyukluk = 3
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
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    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
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tablo.yerlestir(41,"Sena");

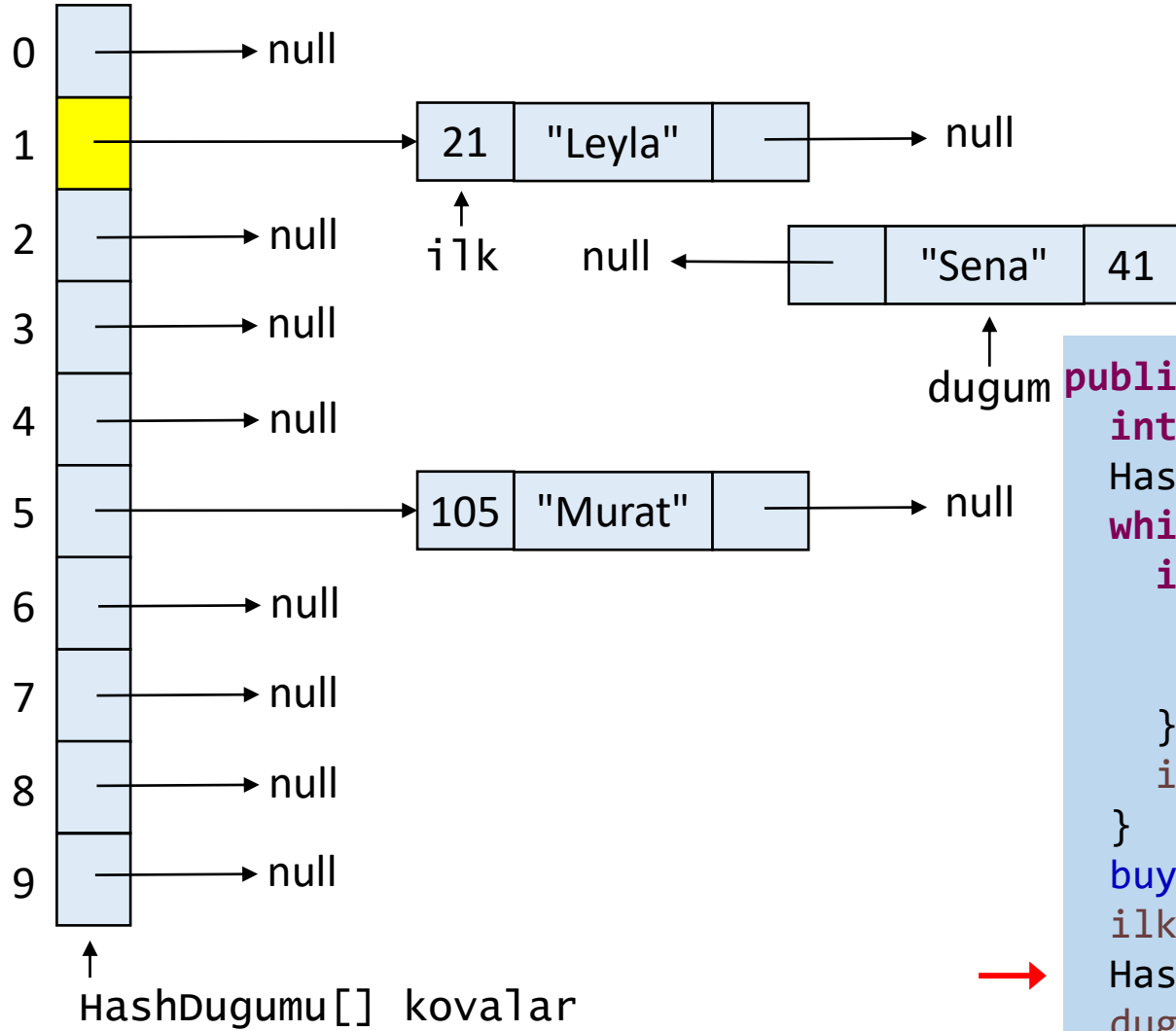


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 buyukluk = 3
 anahtar = 41
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 kovaIndeksi = 1

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    kovalar[kovaIndeksi] = dugum;
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```



tablo.yerlestir(41,"Sena");

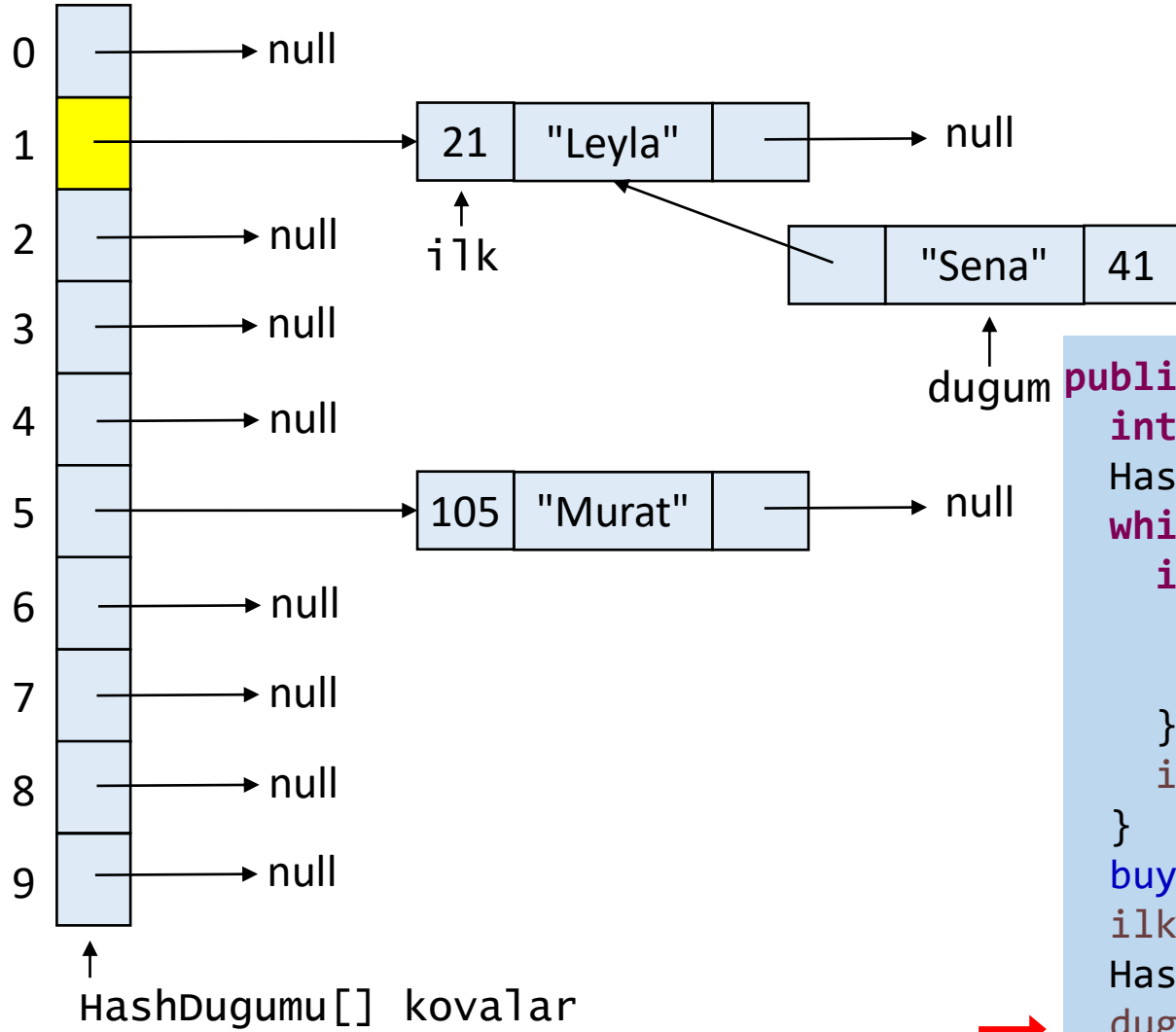


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 buyukluk = 3
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
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    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```



tablo.yerlestir(41,"Sena");

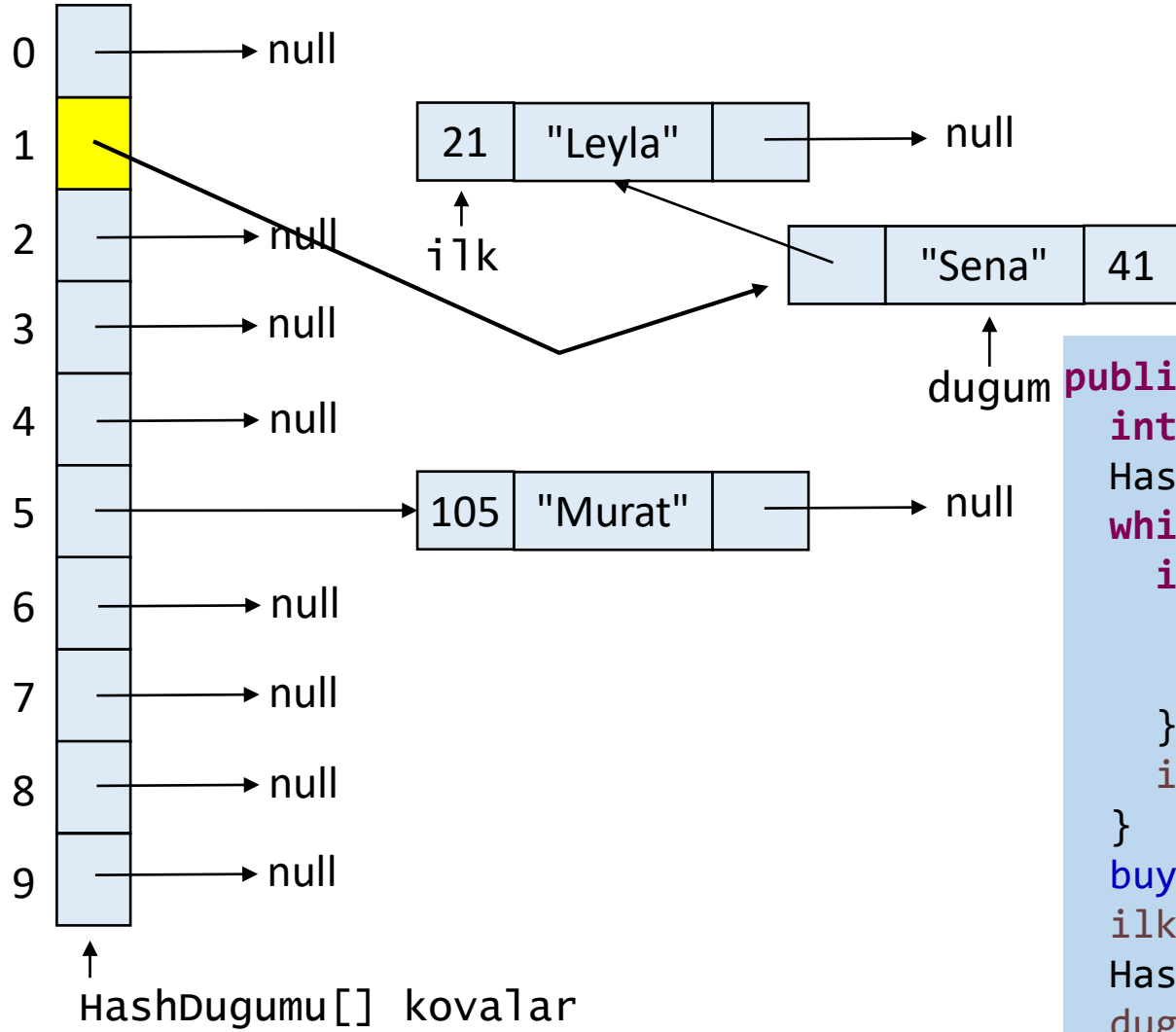


kovaSayisi = 10
 buyukluk = 3
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
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    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```



tablo.yerlestir(41,"Sena");

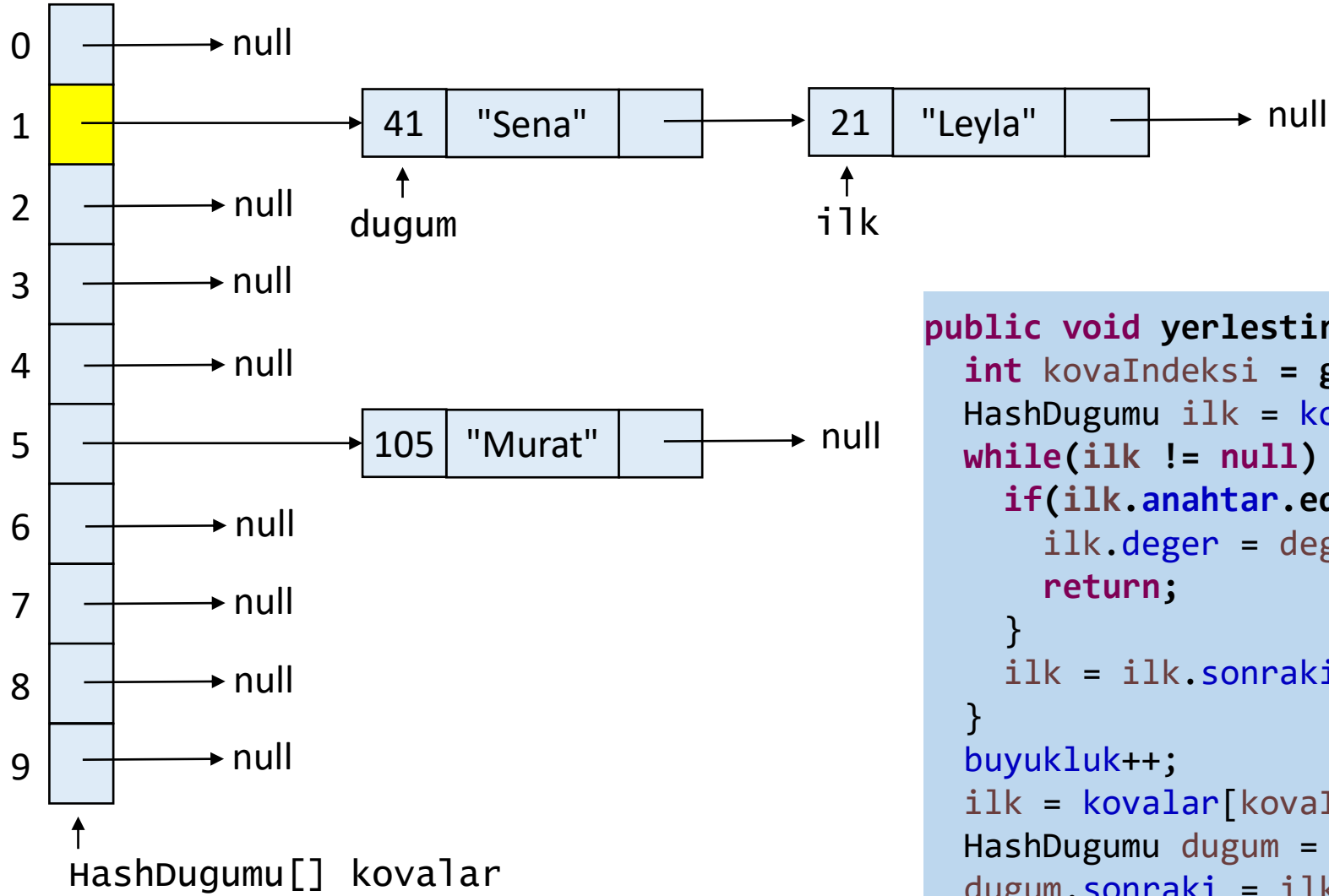


kovaSayisi = 10
 buyukluk = 3
 anahtar = 41
 deger = "Sena"
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    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```



tablo.yerlestir(41,"Sena");

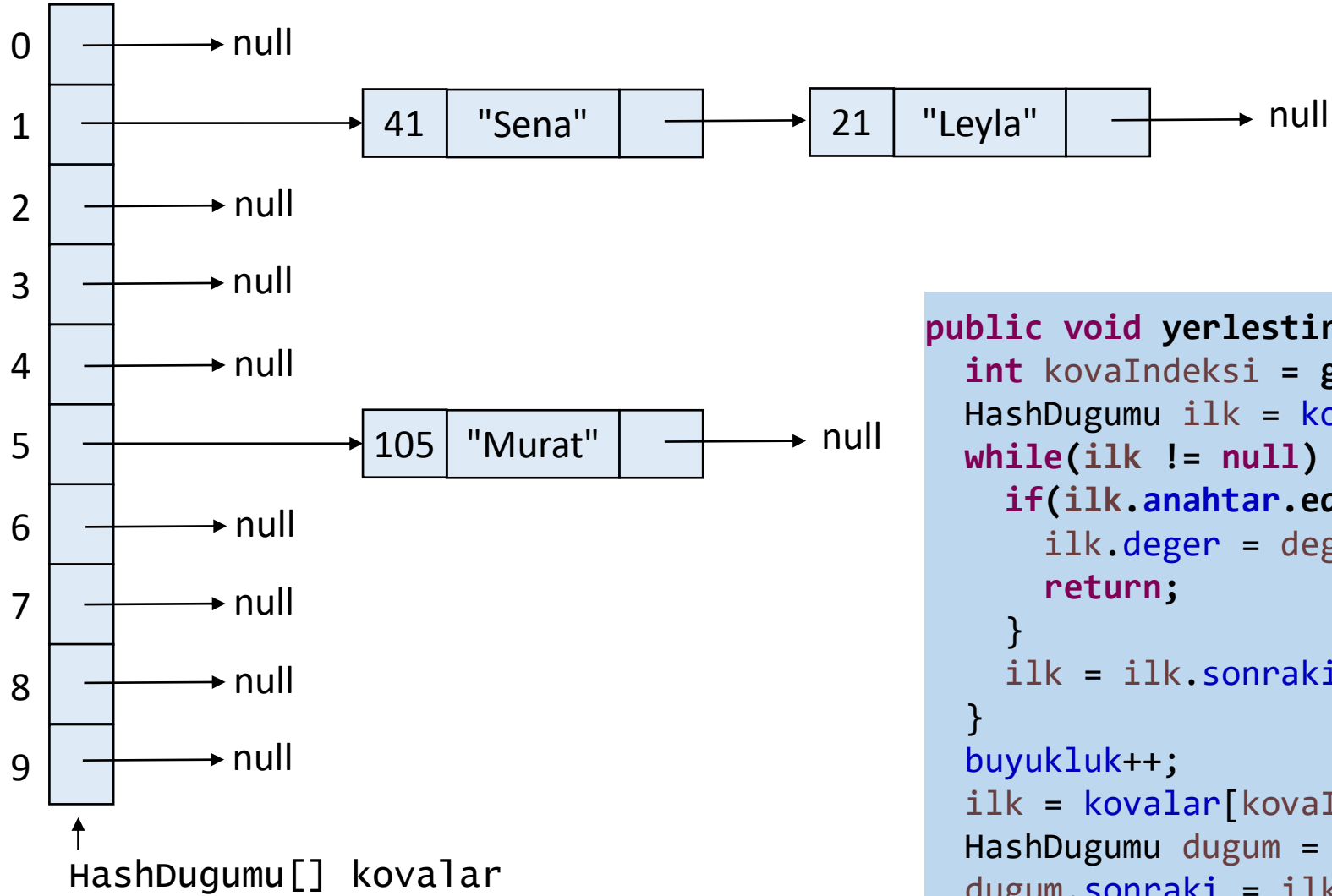


kovaSayisi = 10
 buyukluk = 3
 anahtar = 41
 deger = "Sena"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
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    HashDugumu ilk = kovalar[kovaIndeksi];
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            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
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    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

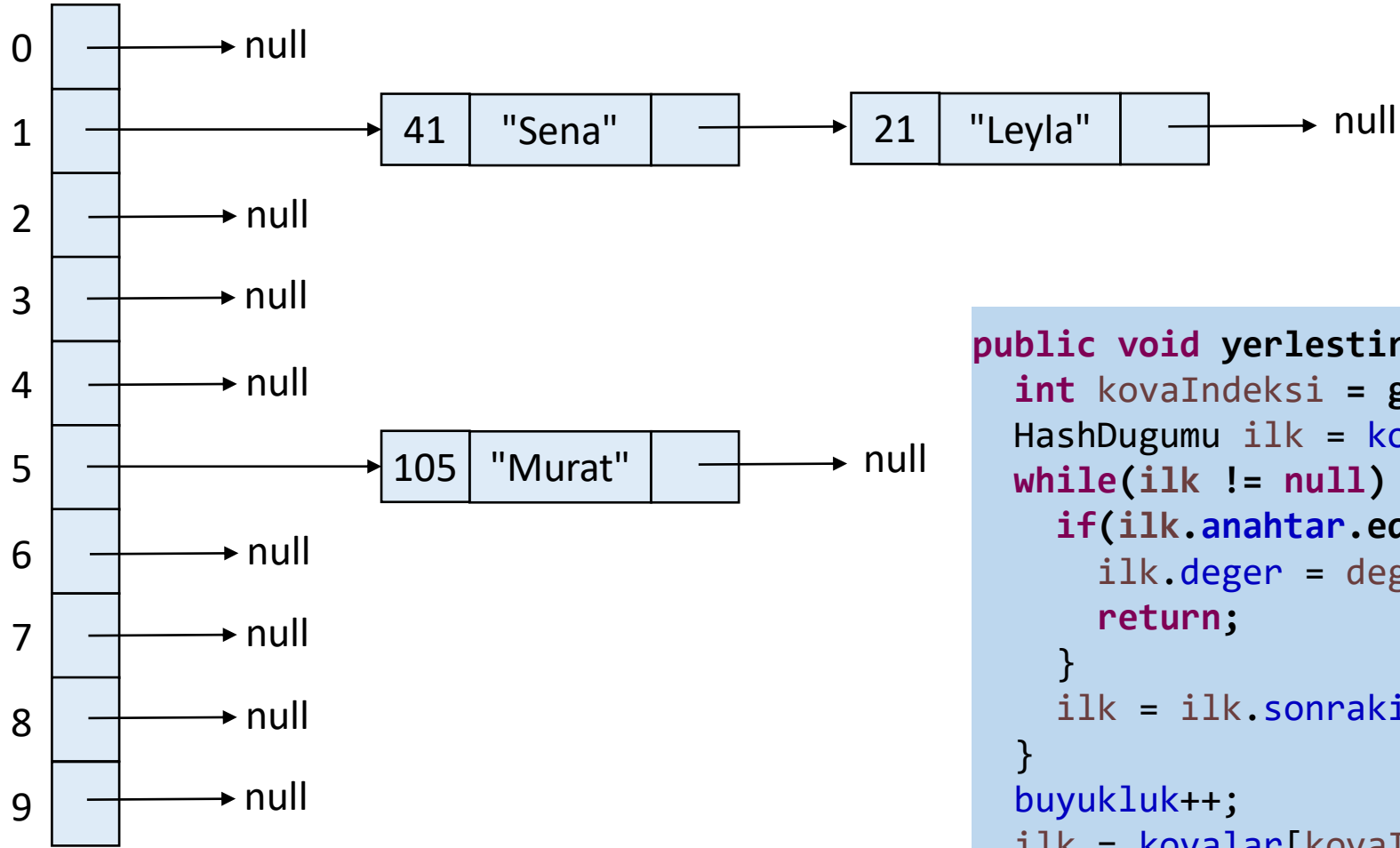


tablo.yerlestir(41,"Sena");



kovaSayisi = 10
buyukluk = 3

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
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    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
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    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

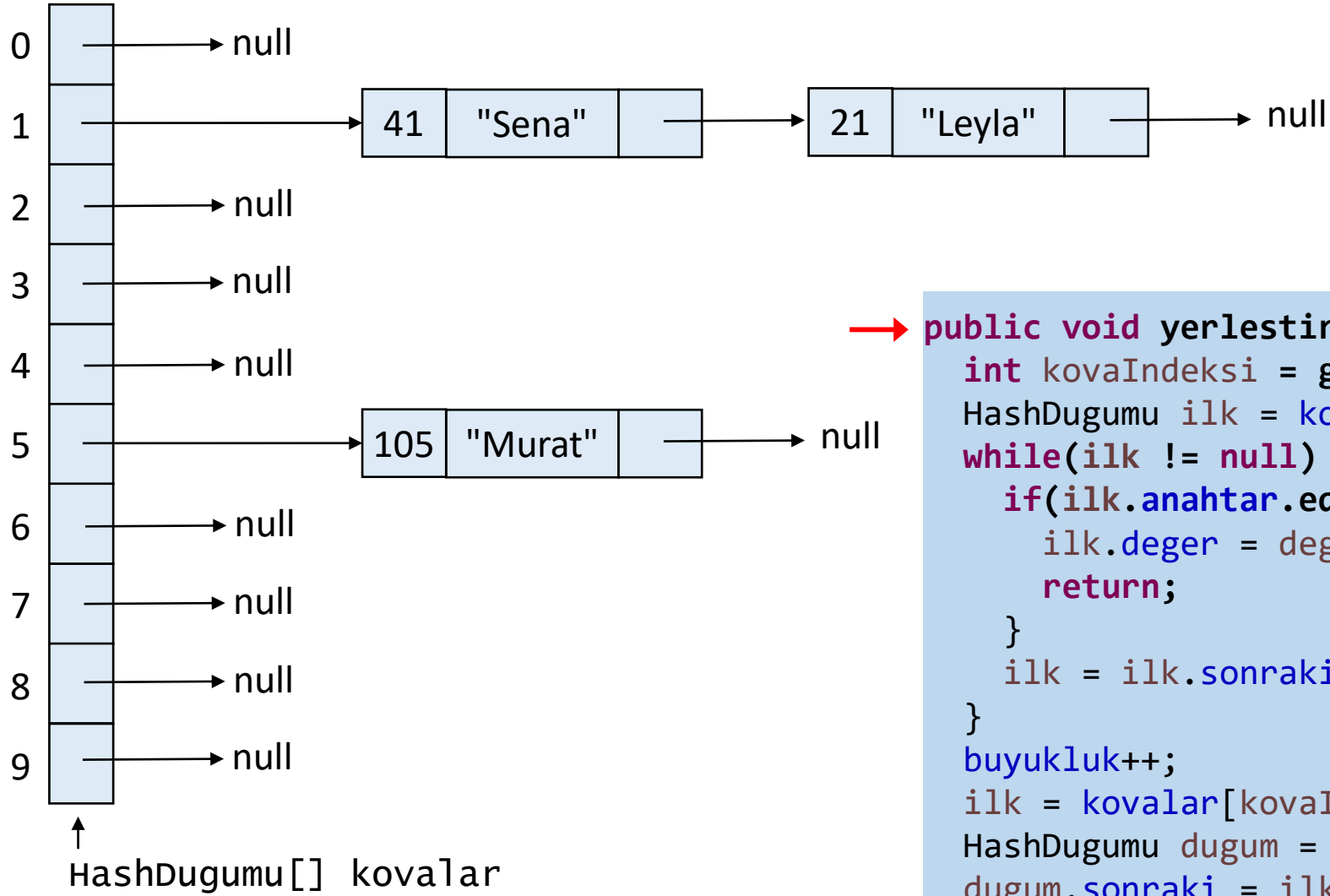


↑
HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 3

```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            ilk.deger = deger;  
            return;  
        }  
        ilk = ilk.sonraki;  
    }  
    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

tablo.yerlestir(21,"Ali");



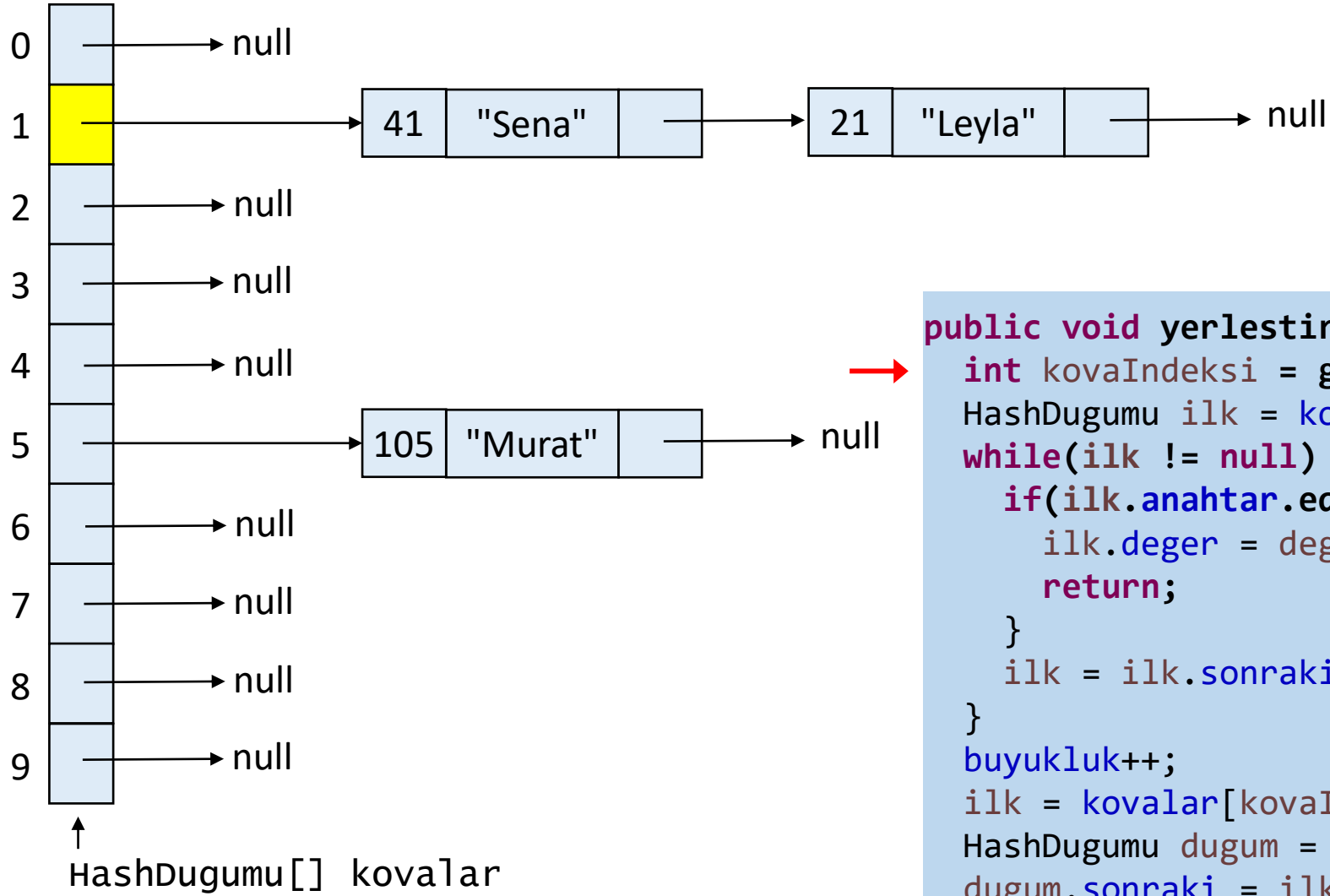
kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 deger = "Ali"

```

→ public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
        }
        ilk = ilk.sonraki;
    }
    buyukluk++;
    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}

```

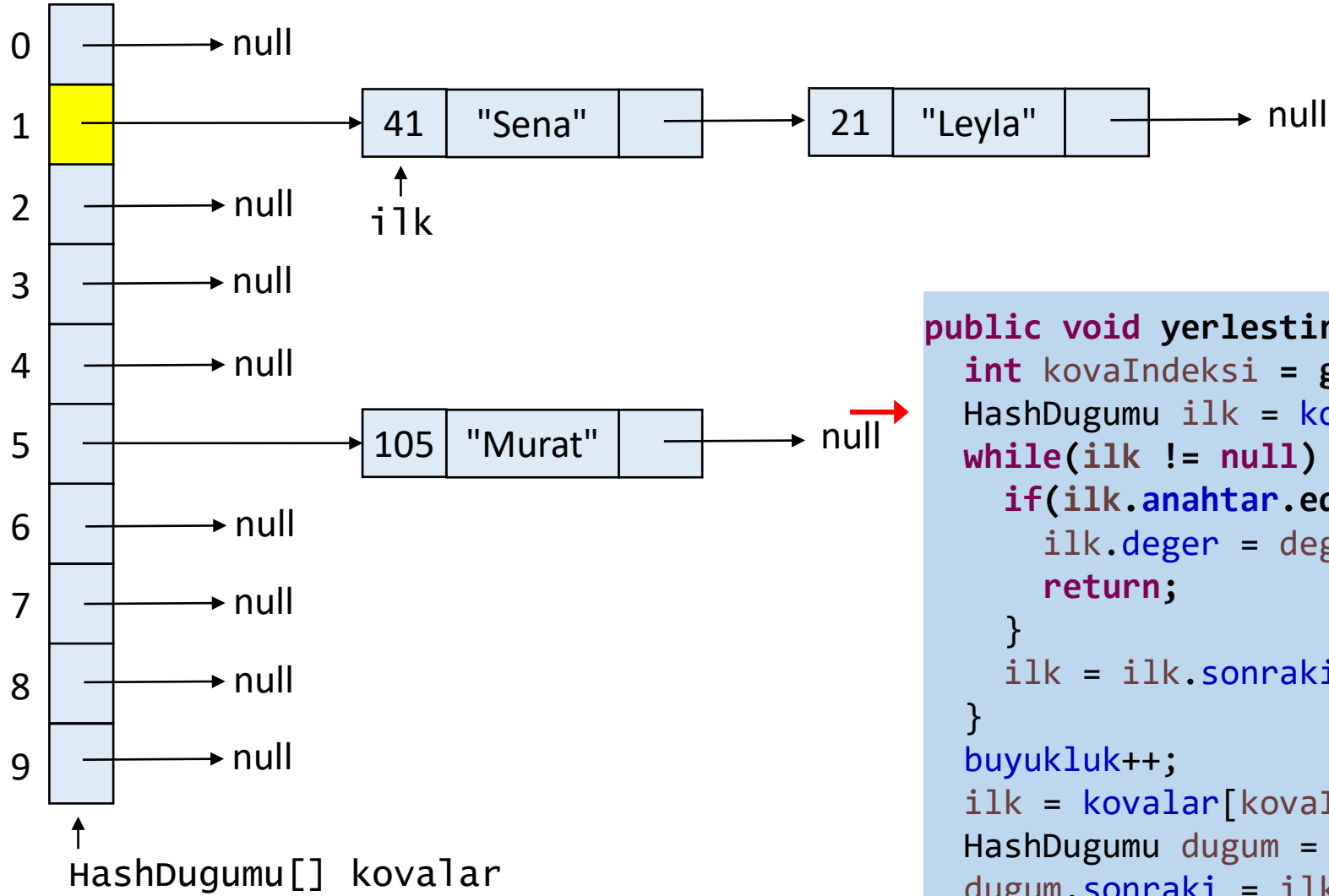
tablo.yerlestir(21,"Ali");



kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 deger = "Ali"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            ilk.deger = deger;
            return;
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    ilk = kovalar[kovaIndeksi];
    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
}
```

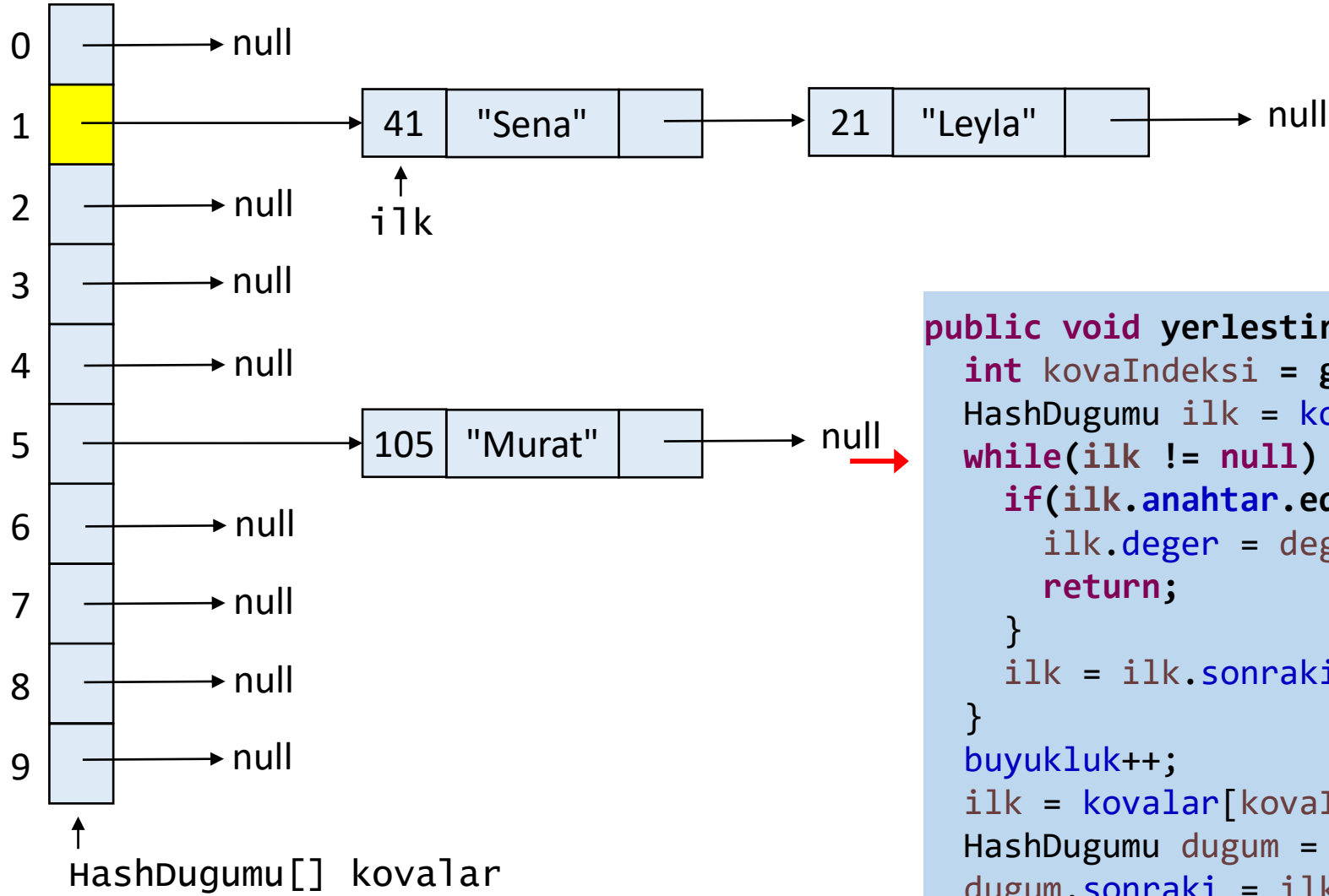
tablo.yerlestir(21,"Ali");



kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 deger = "Ali"
 kovaIndeksi = 1

```
public void yerlestir(Integer anahtar, String deger) {
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    while(ilk != null) {
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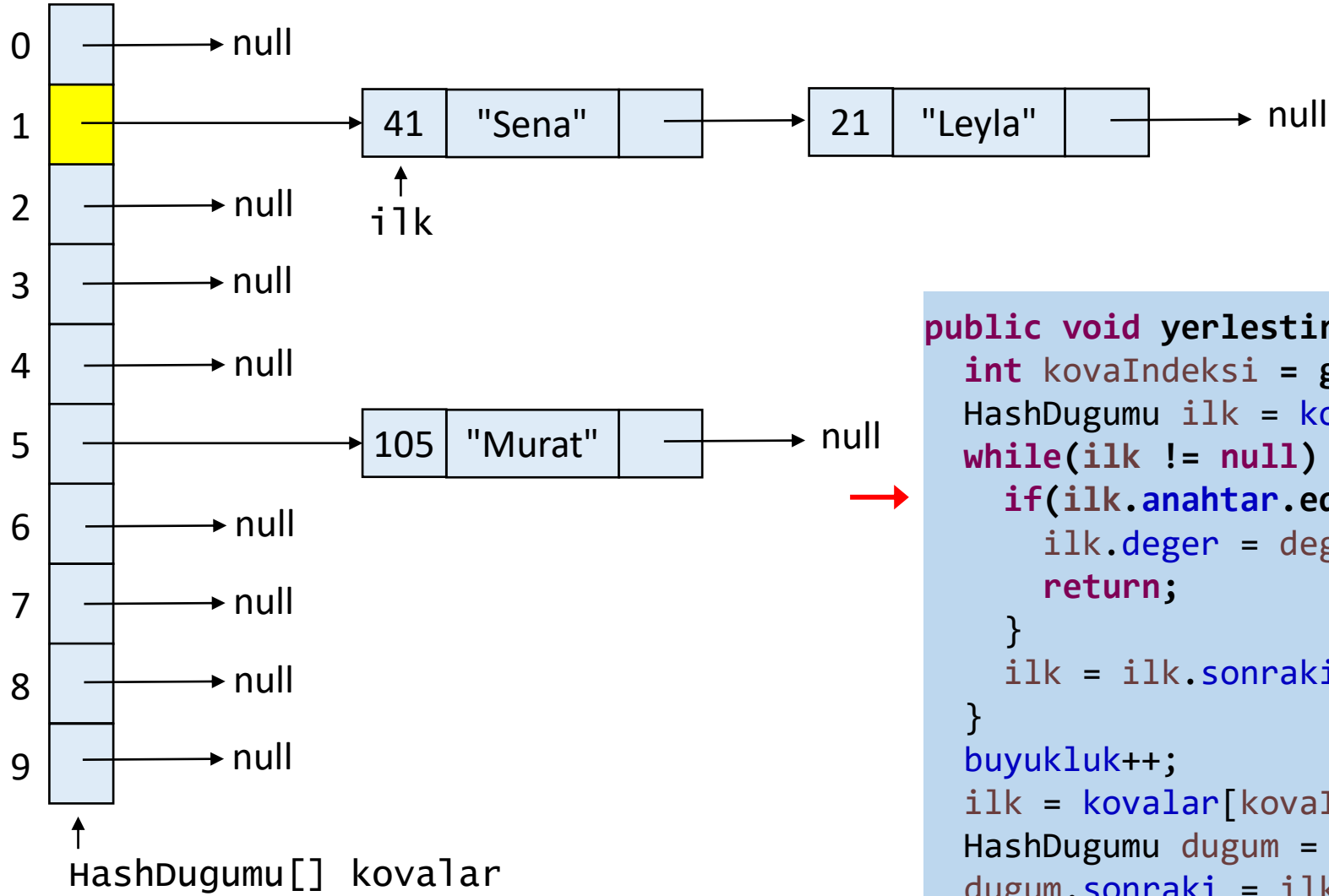
tablo.yerlestir(21,"Ali");



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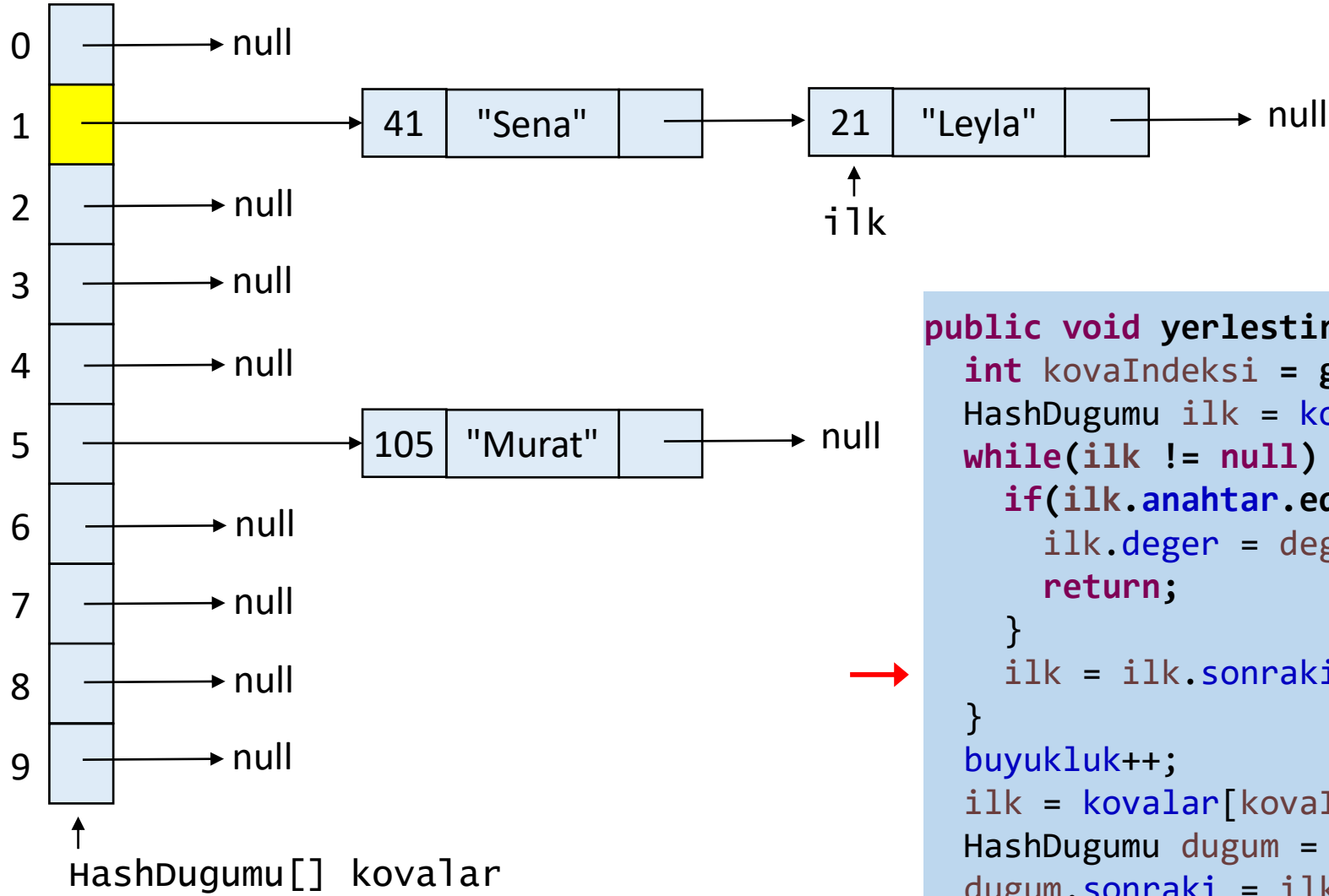
tablo.yerlestir(21,"Ali");



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    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
    kovalar[kovaIndeksi] = dugum;
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```

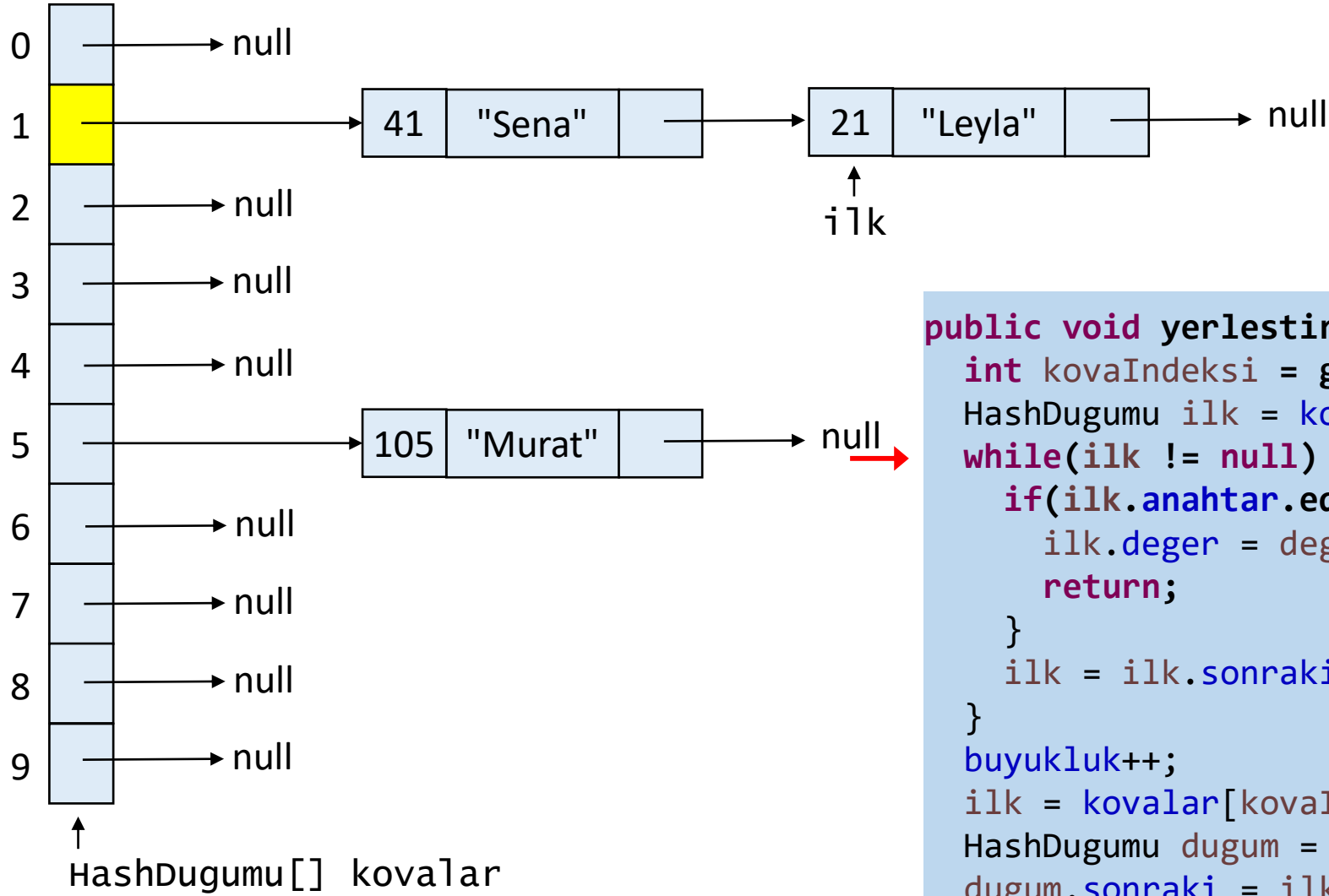
tablo.yerlestir(21,"Ali");



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```

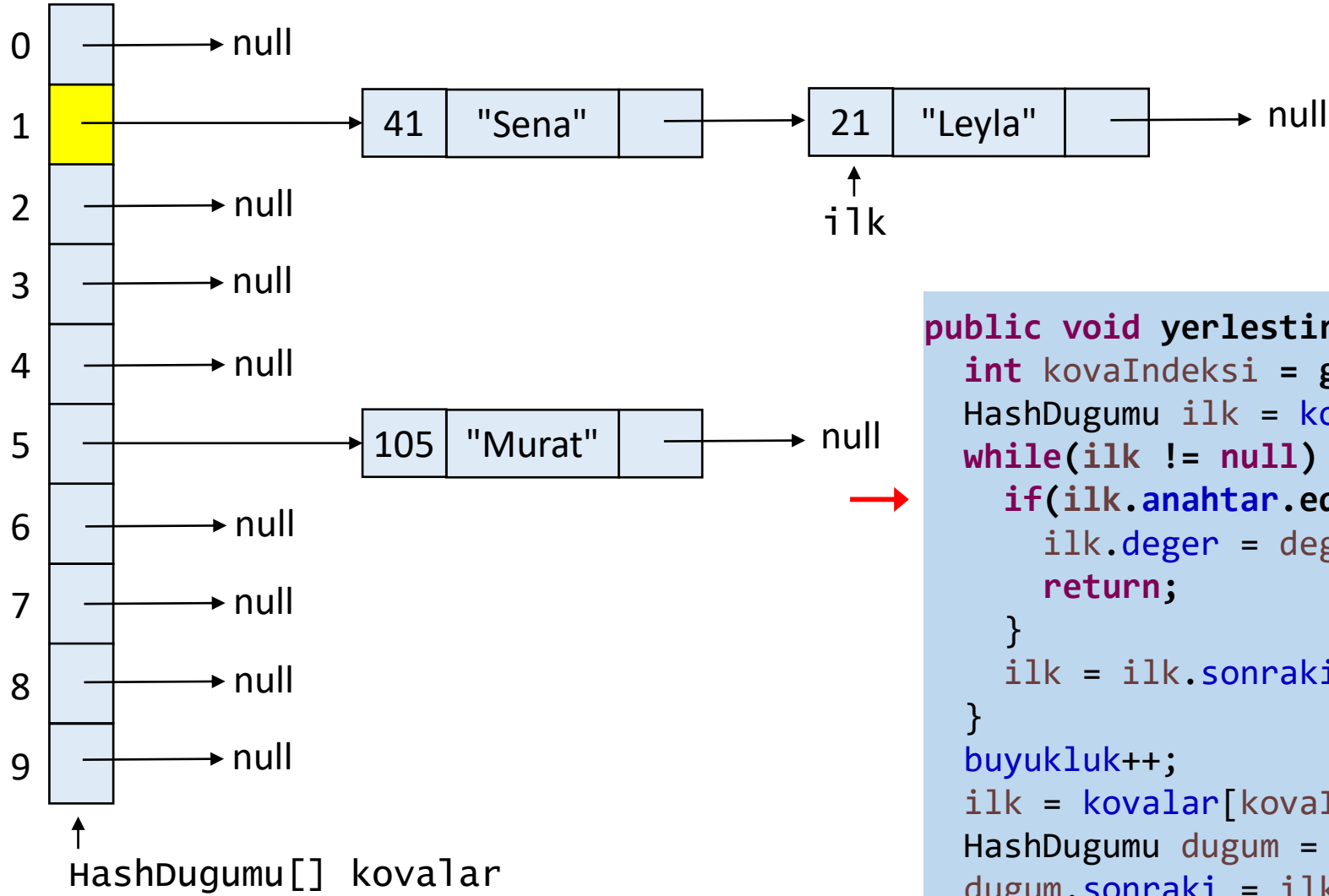
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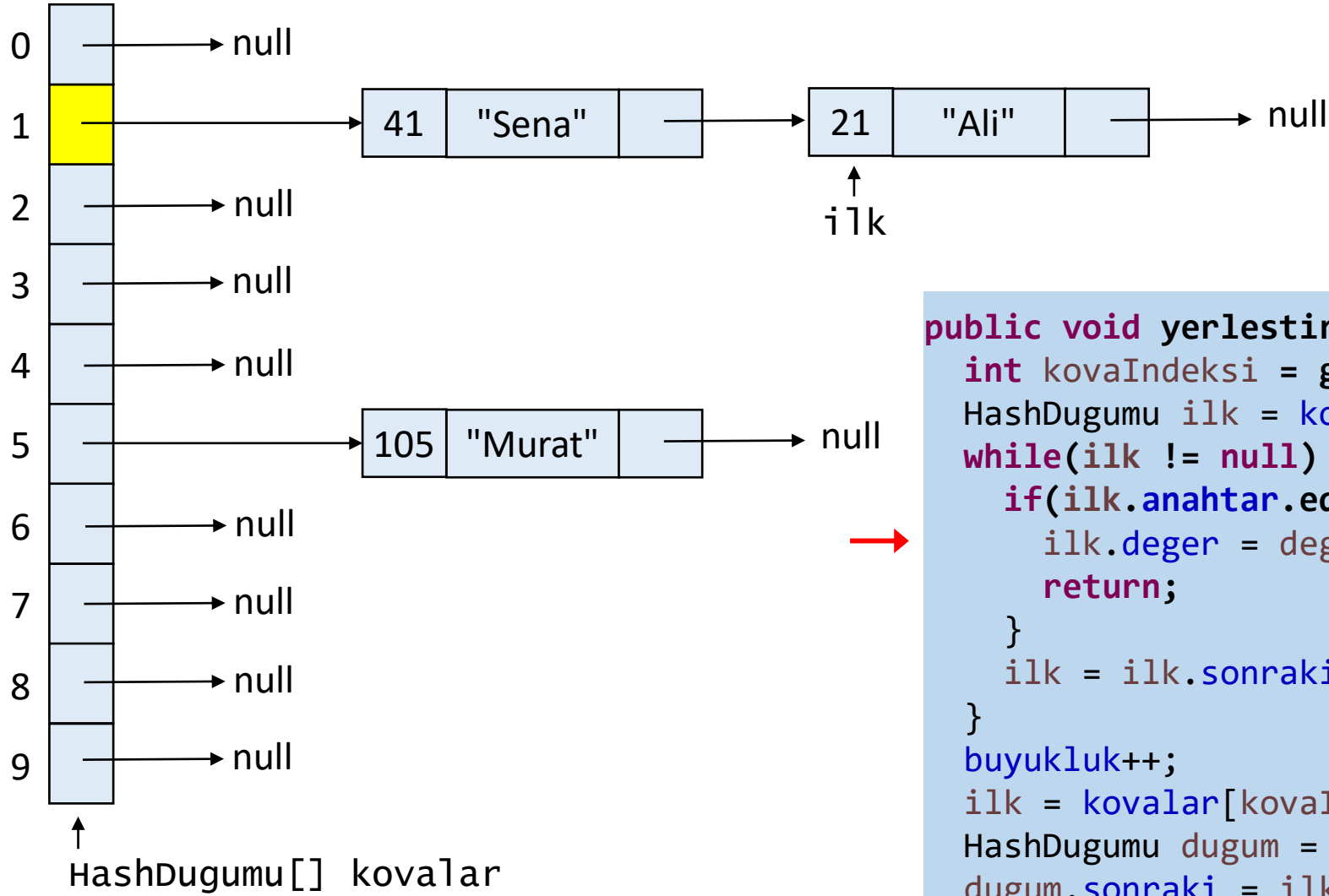
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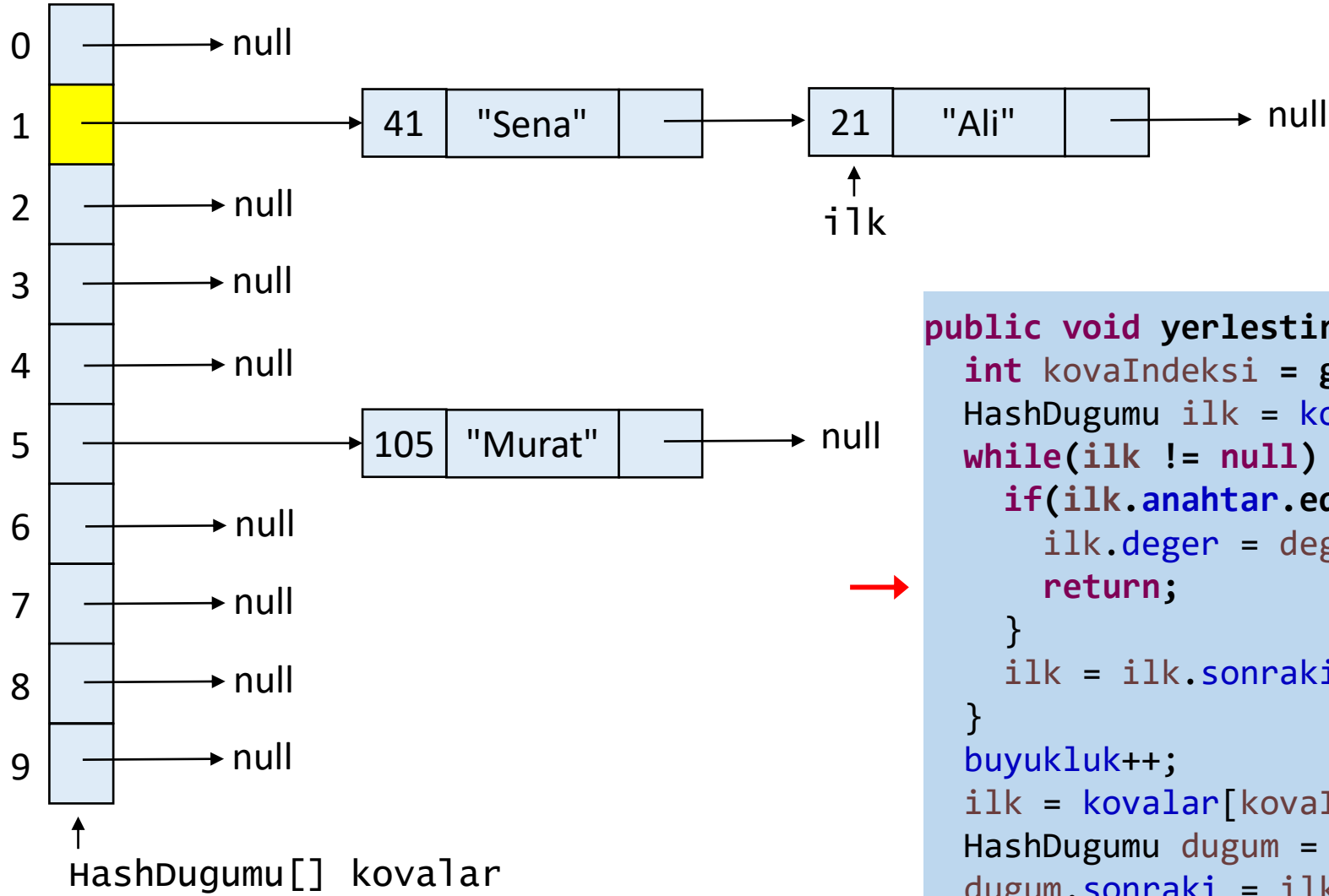
tablo.yerlestir(21,"Ali");



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    HashDugumu dugum = new HashDugumu(anahtar, deger);
    dugum.sonraki = ilk;
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}
```

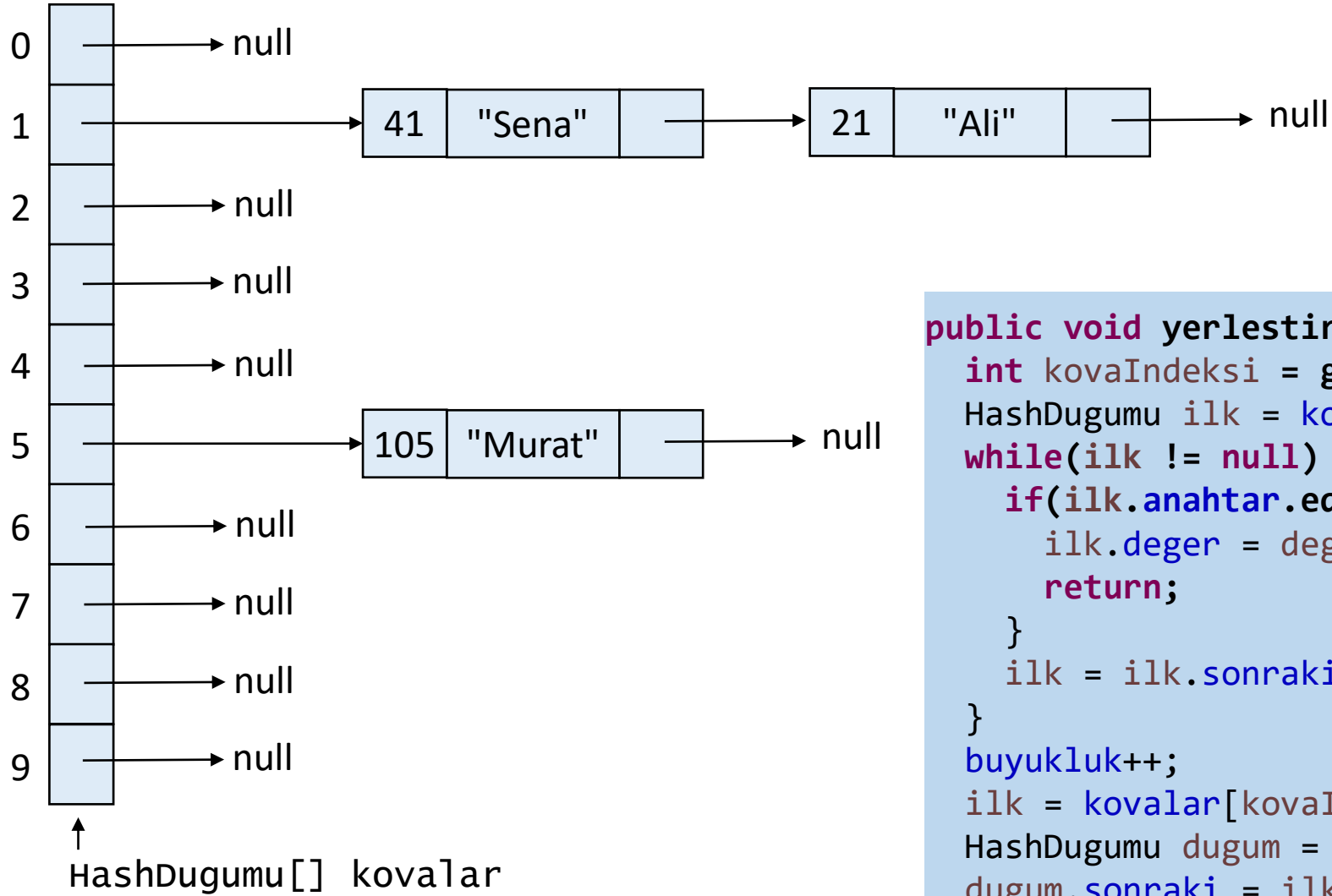
tablo.yerlestir(21,"Ali");



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tablo.yerlestir(21,"Ali");

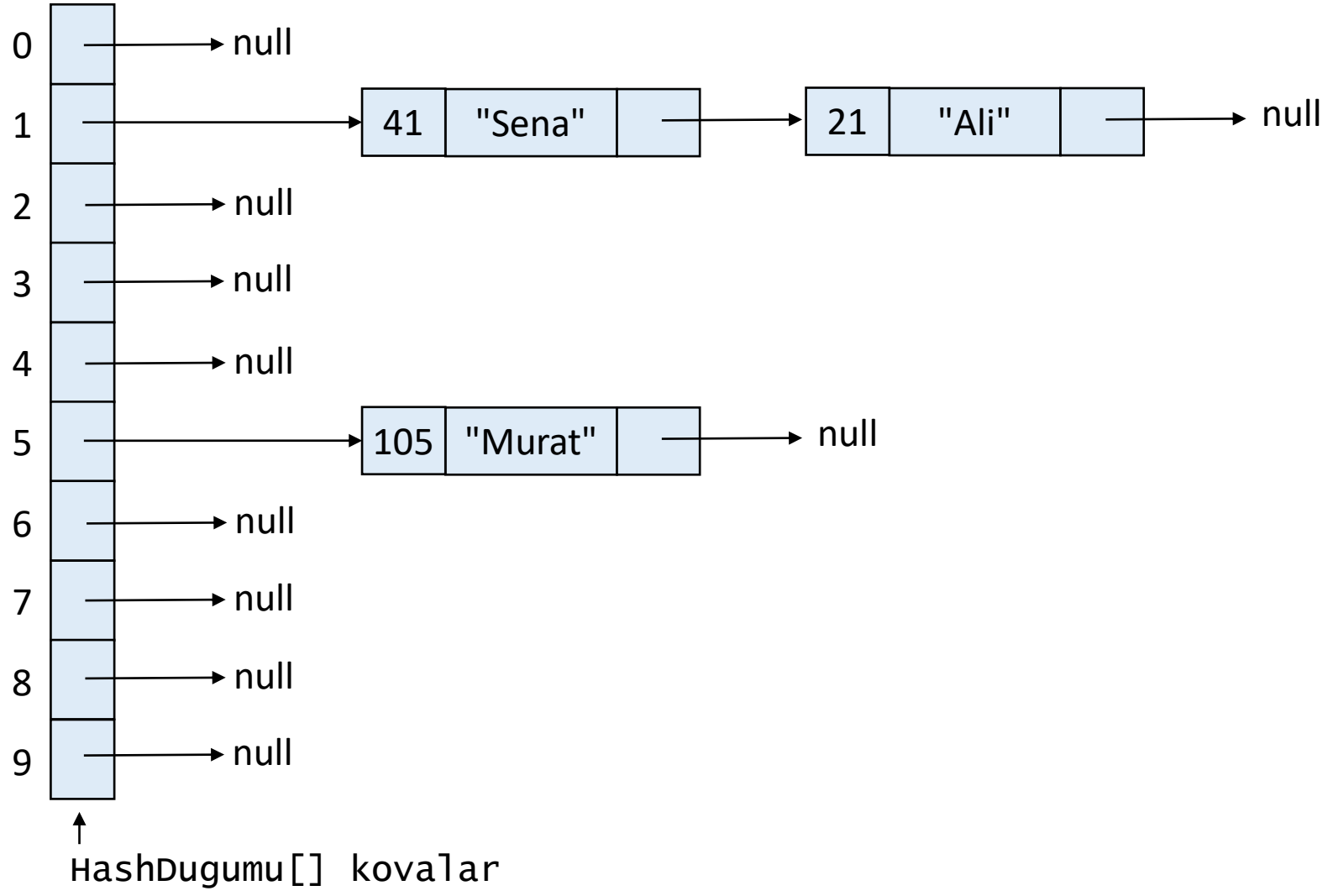


kovaSayisi = 10
buyukluk = 3

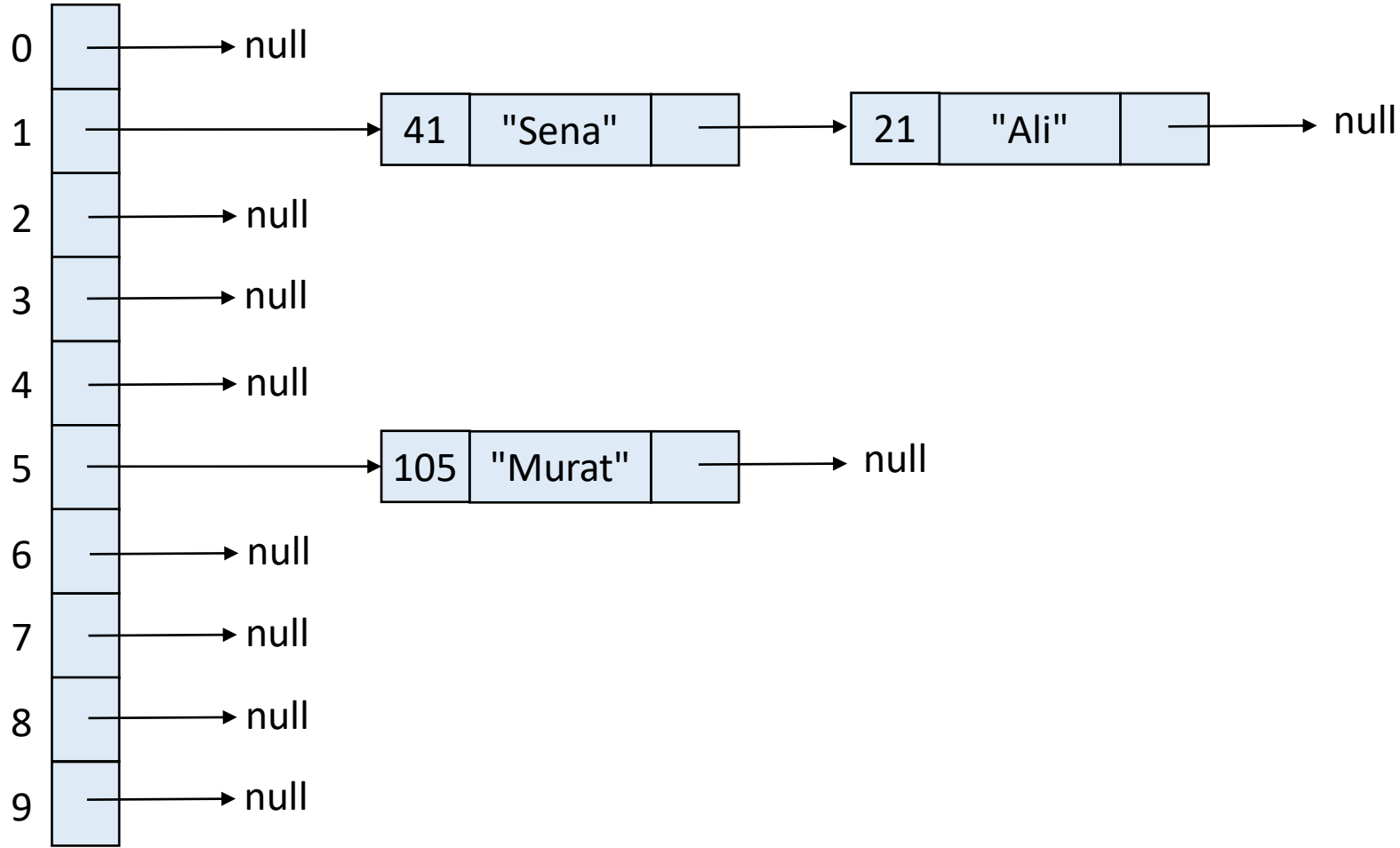
```
public void yerlestir(Integer anahtar, String deger) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
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    buyukluk++;  
    ilk = kovalar[kovaIndeksi];  
    HashDugumu dugum = new HashDugumu(anahtar, deger);  
    dugum.sonraki = ilk;  
    kovalar[kovaIndeksi] = dugum;  
}
```

Hash Tablosundan Anahtar ile Deęer Getirme





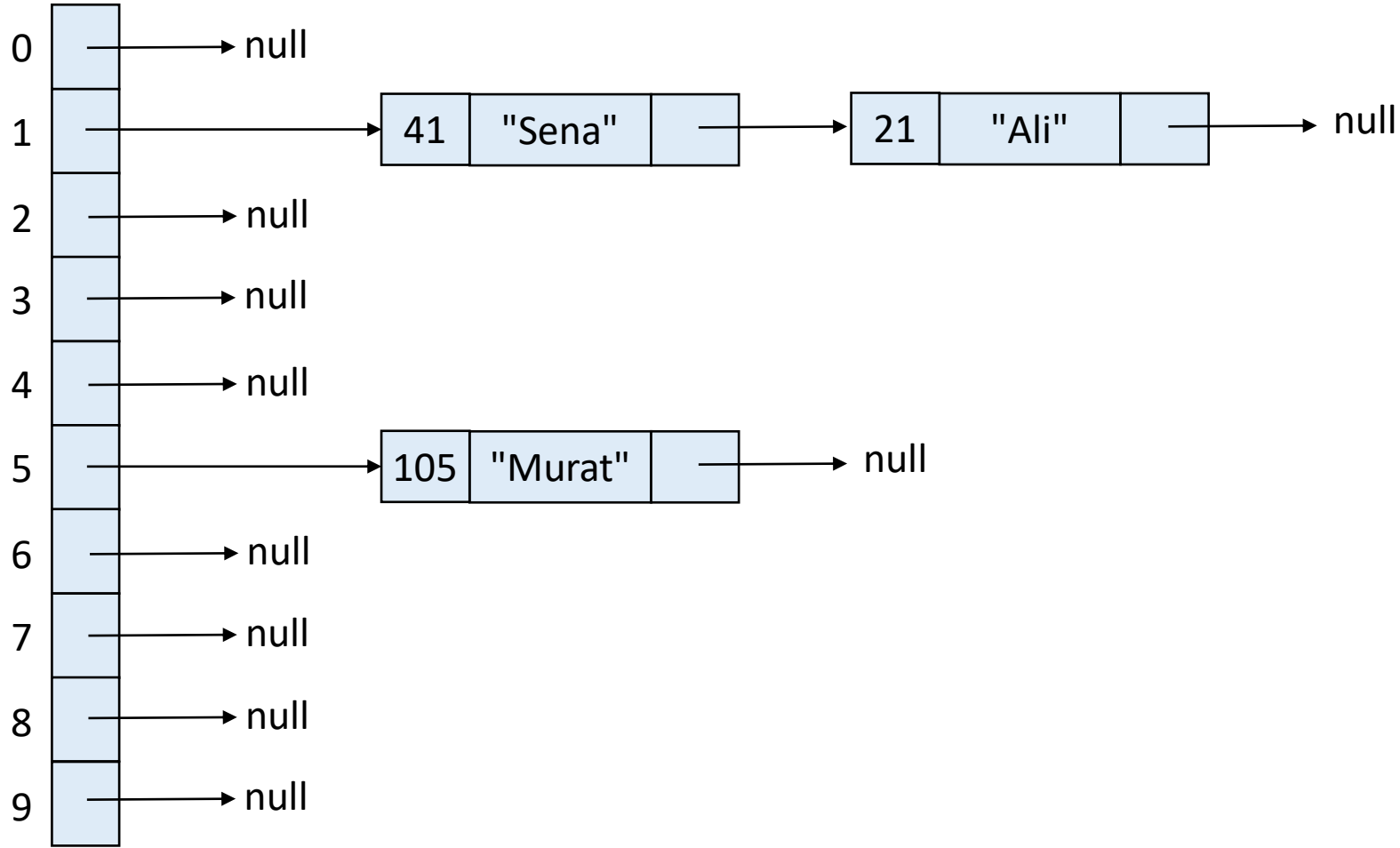
kovaSayisi = 10
buyukluk = 3



kovaSayisi = 10
buyukluk = 3

↑
HashDugumu[] kovalar

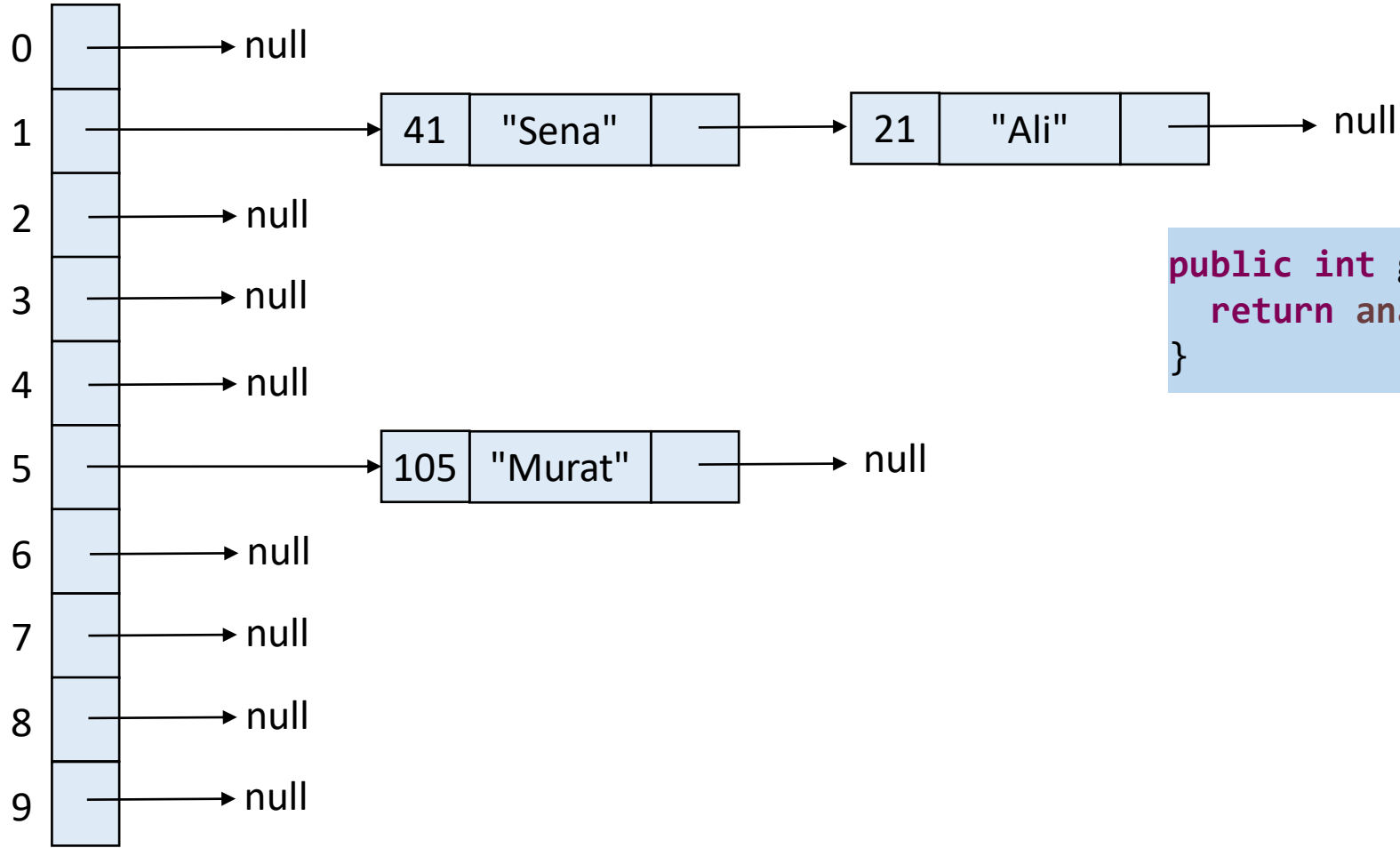
```
tablo.getir(105);
```



kovaSayisi = 10
buyukluk = 3
anahtar = 105

↑
HashDugumu[] kovalar

```
tablo.getir(105);
```

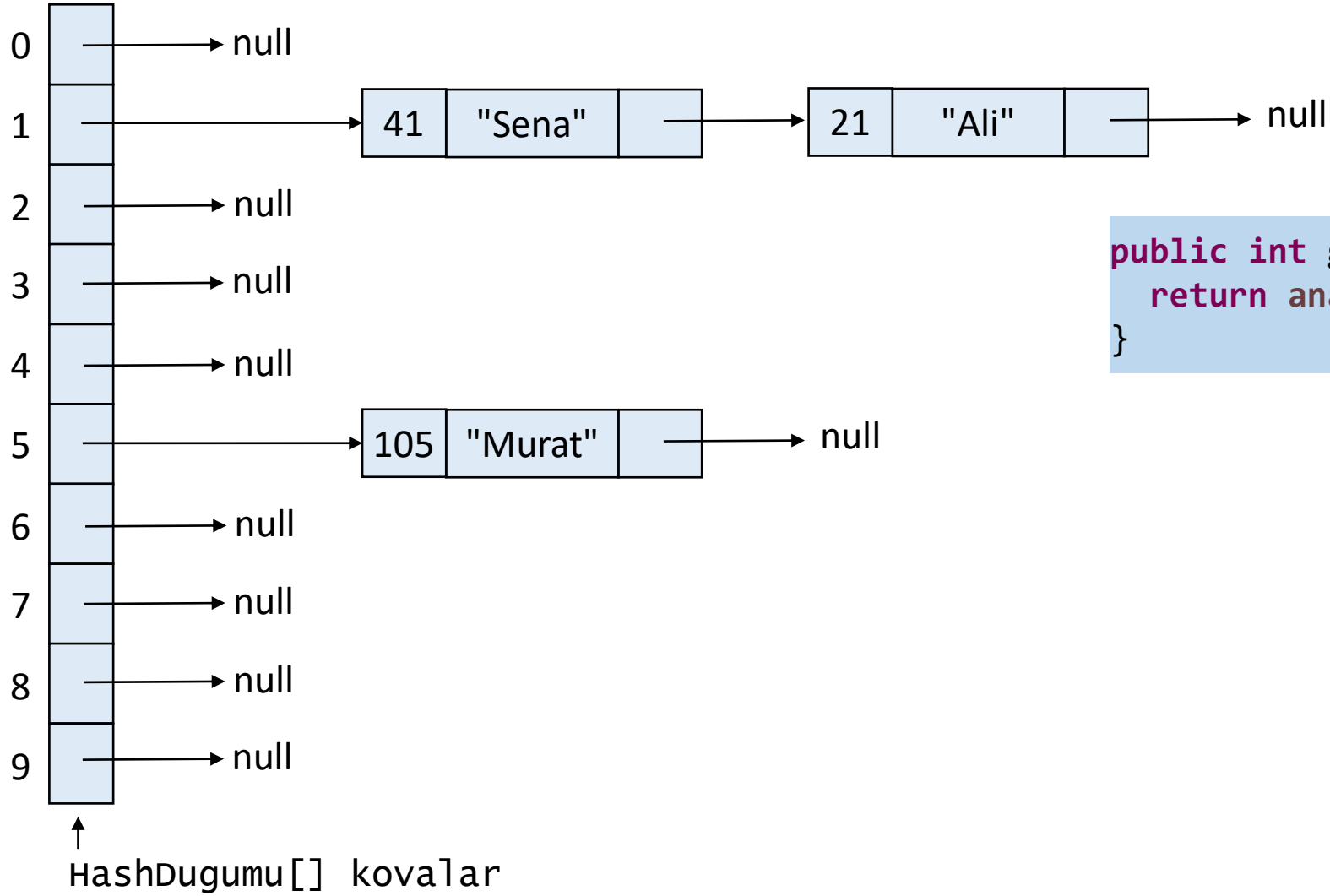


kovaSayisi = 10
buyukluk = 3
anahtar = 105

```
public int getKovaIndeksi(Integer anahtar) {  
    return anahtar % kovalar.length;  
}
```

↑
HashDugumu[] kovalar

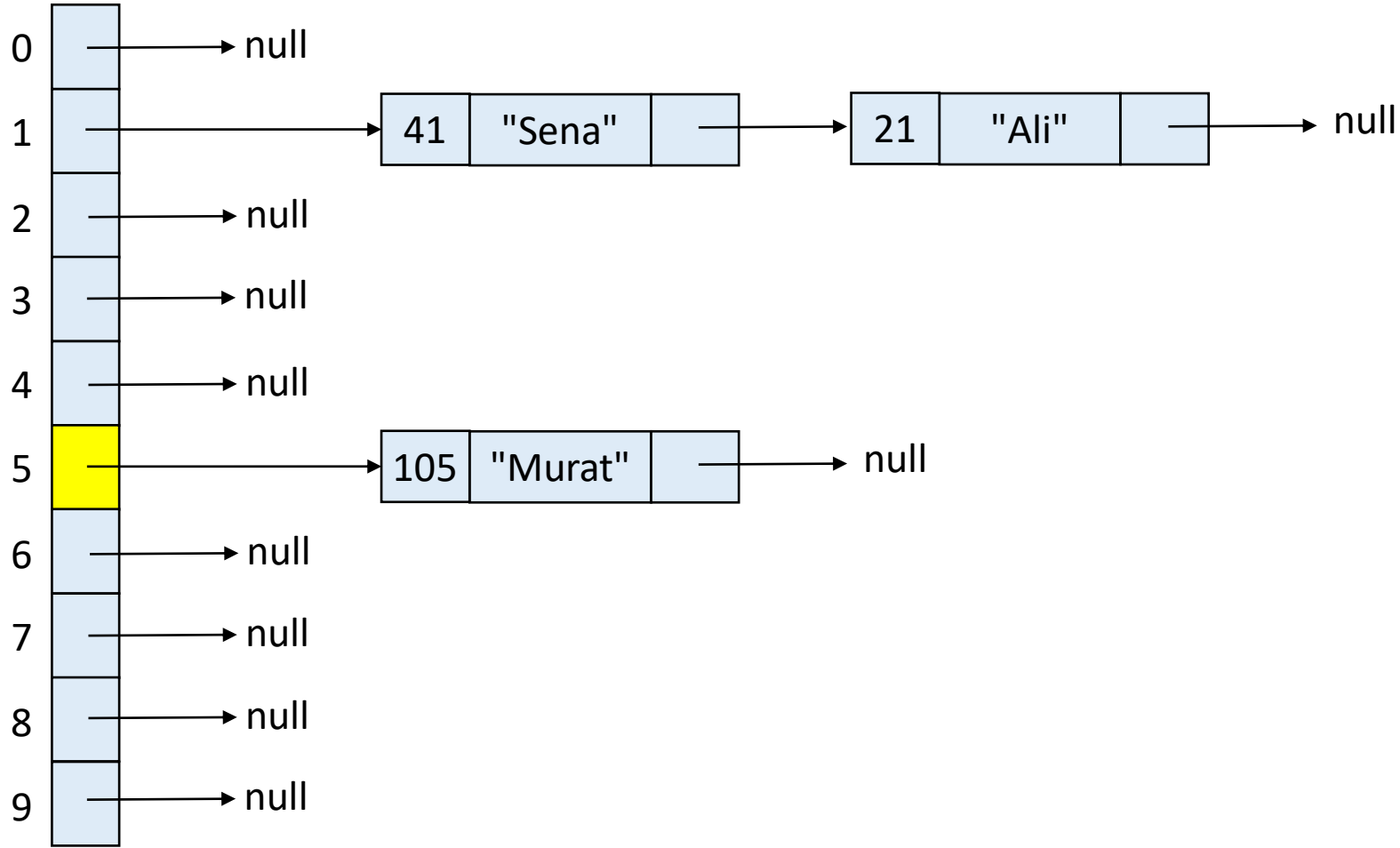
tablo.getir(105);



kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

```
public int getKovaIndeksi(Integer anahtar) {  
    return anahtar % kovalar.length;  
}
```

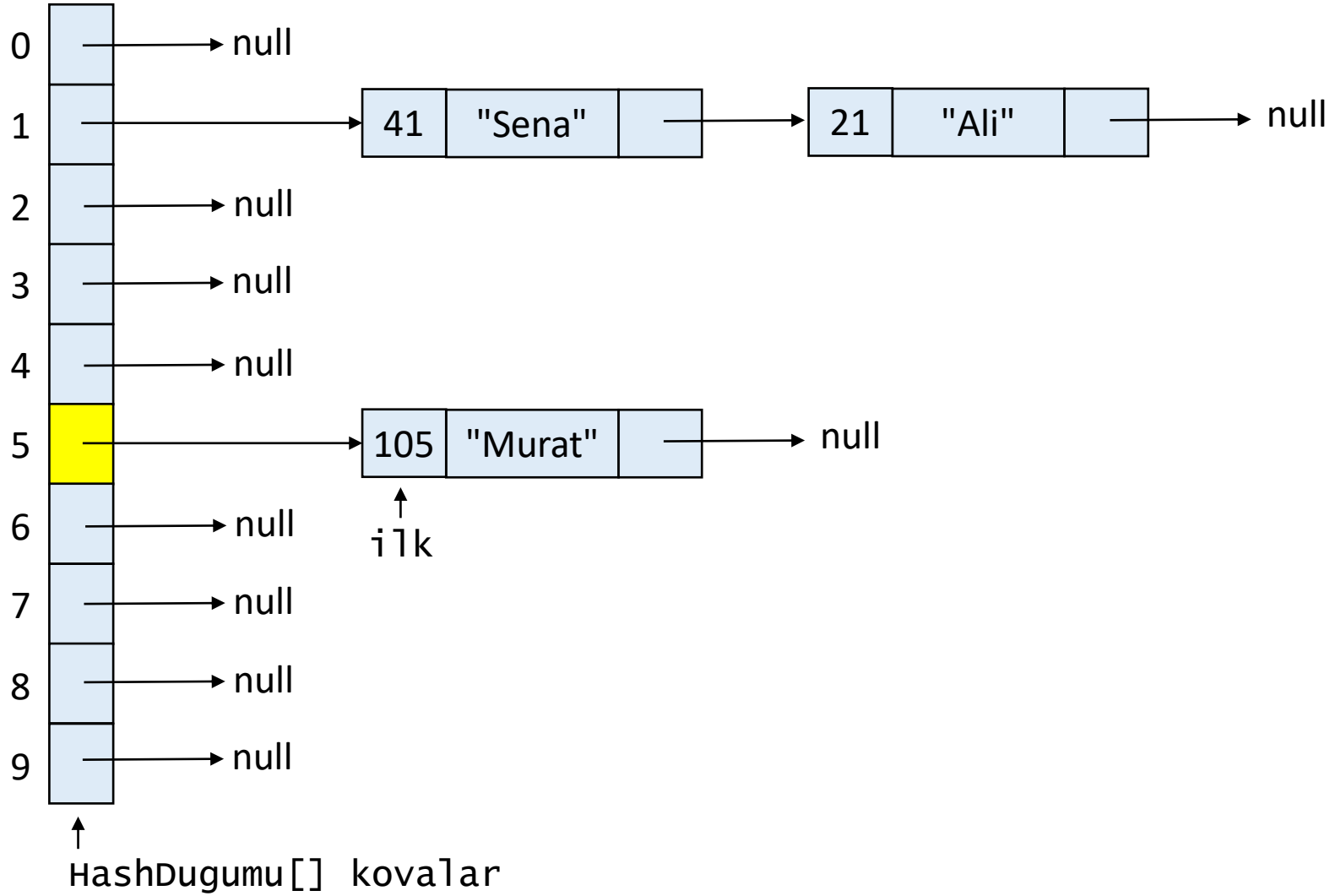
tablo.getir(105);



kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

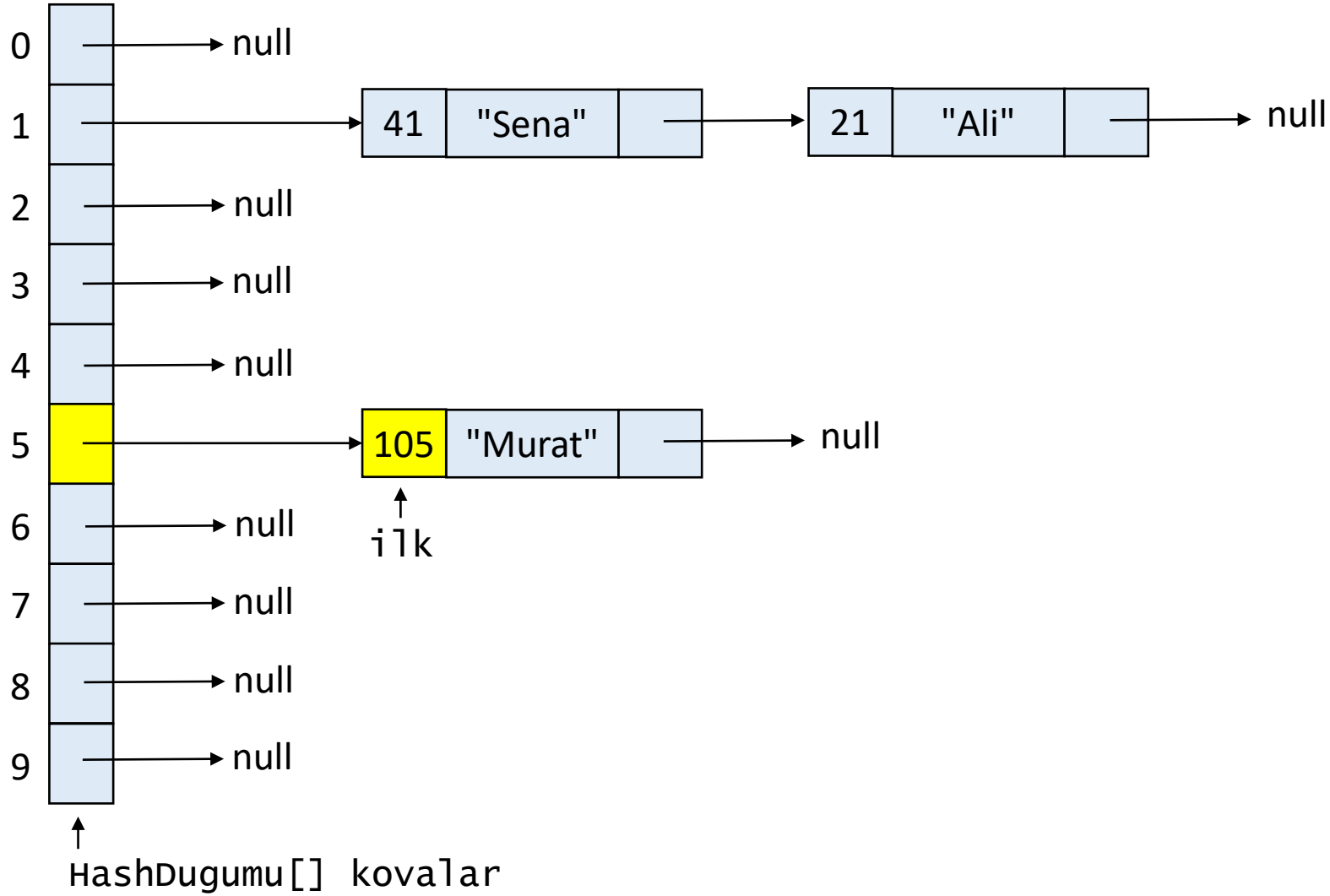
↑
HashDugumu[] kovalar

tablo.getir(105);



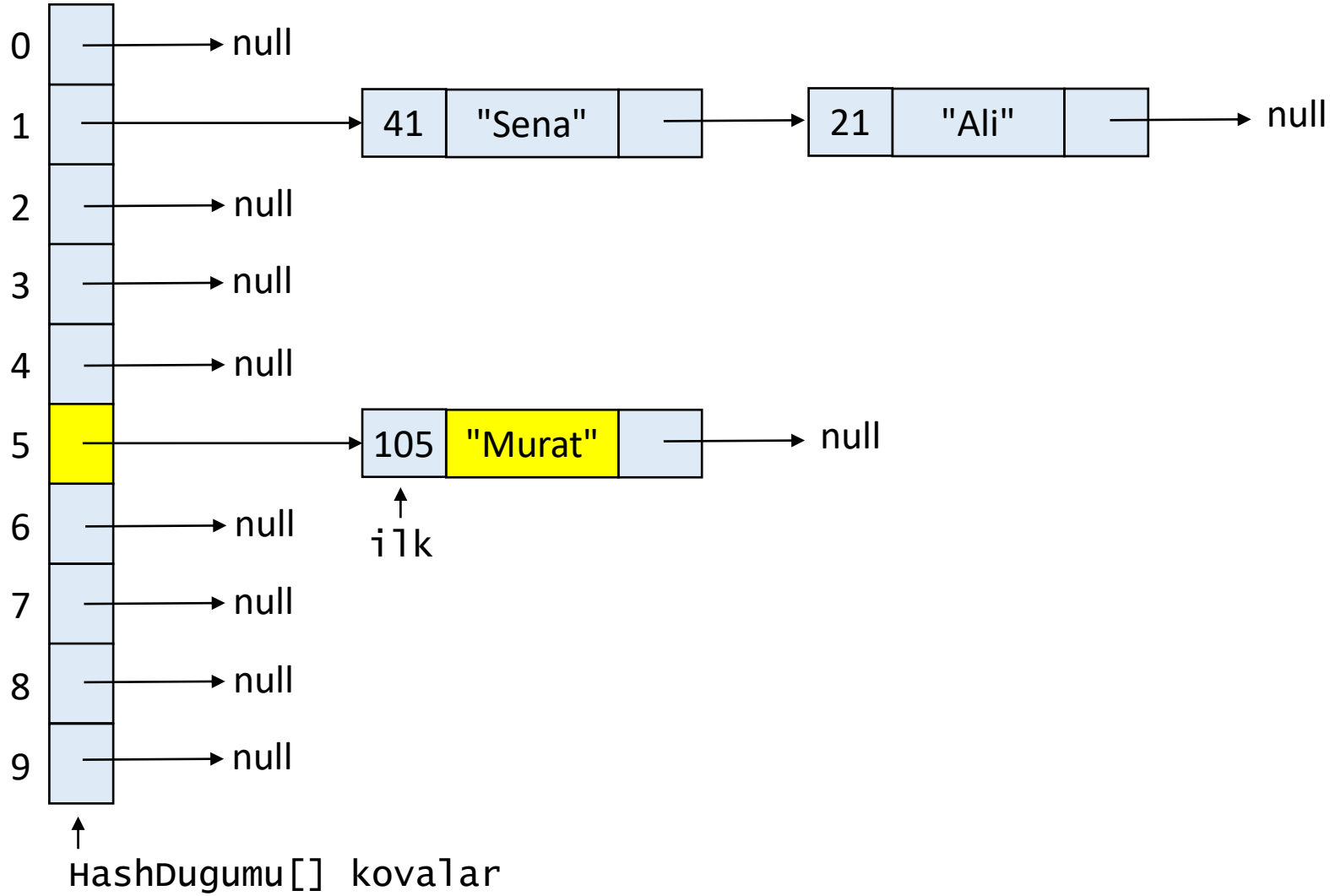
kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

```
tablo.getir(105);
```



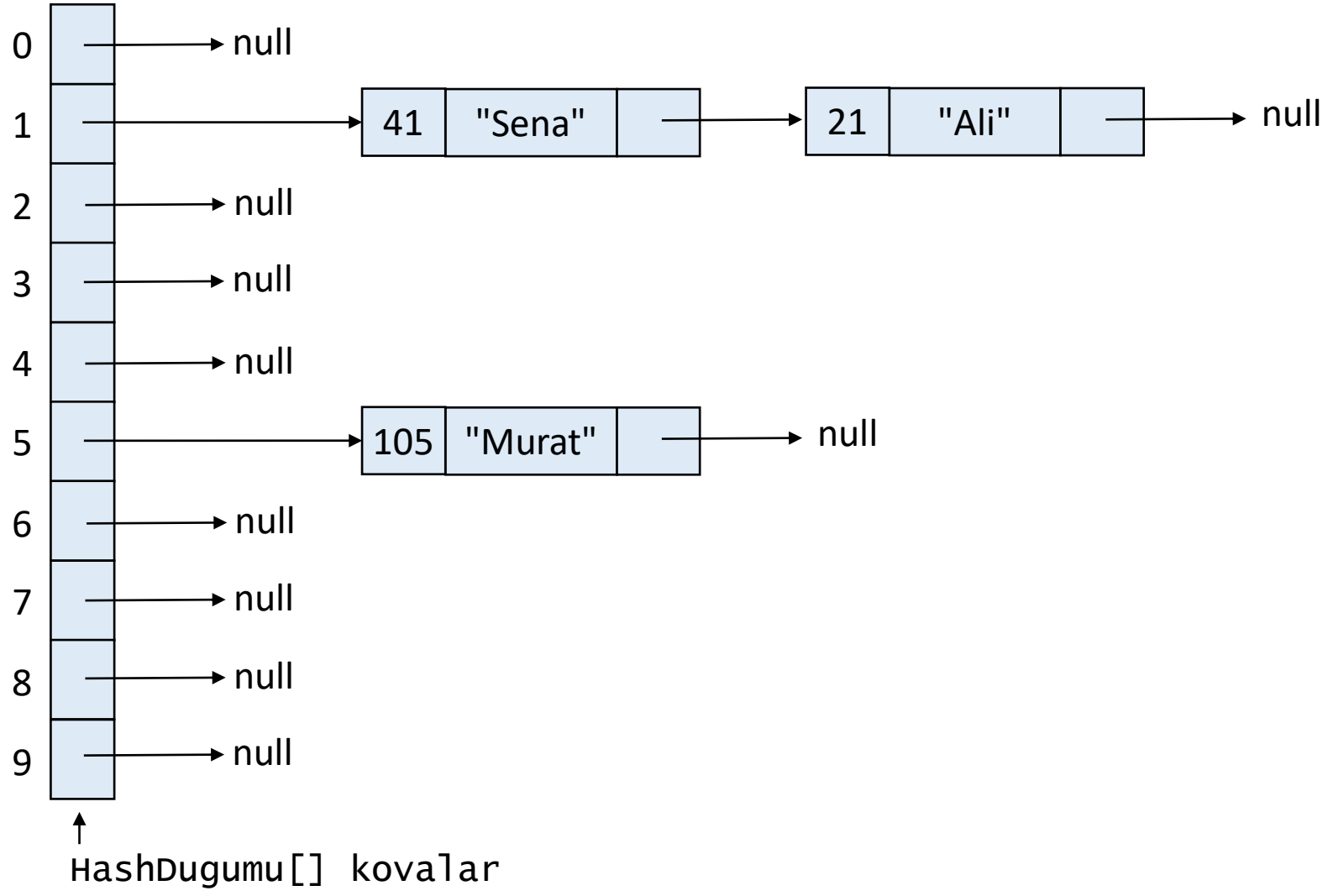
kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

```
tablo.getir(105);
```

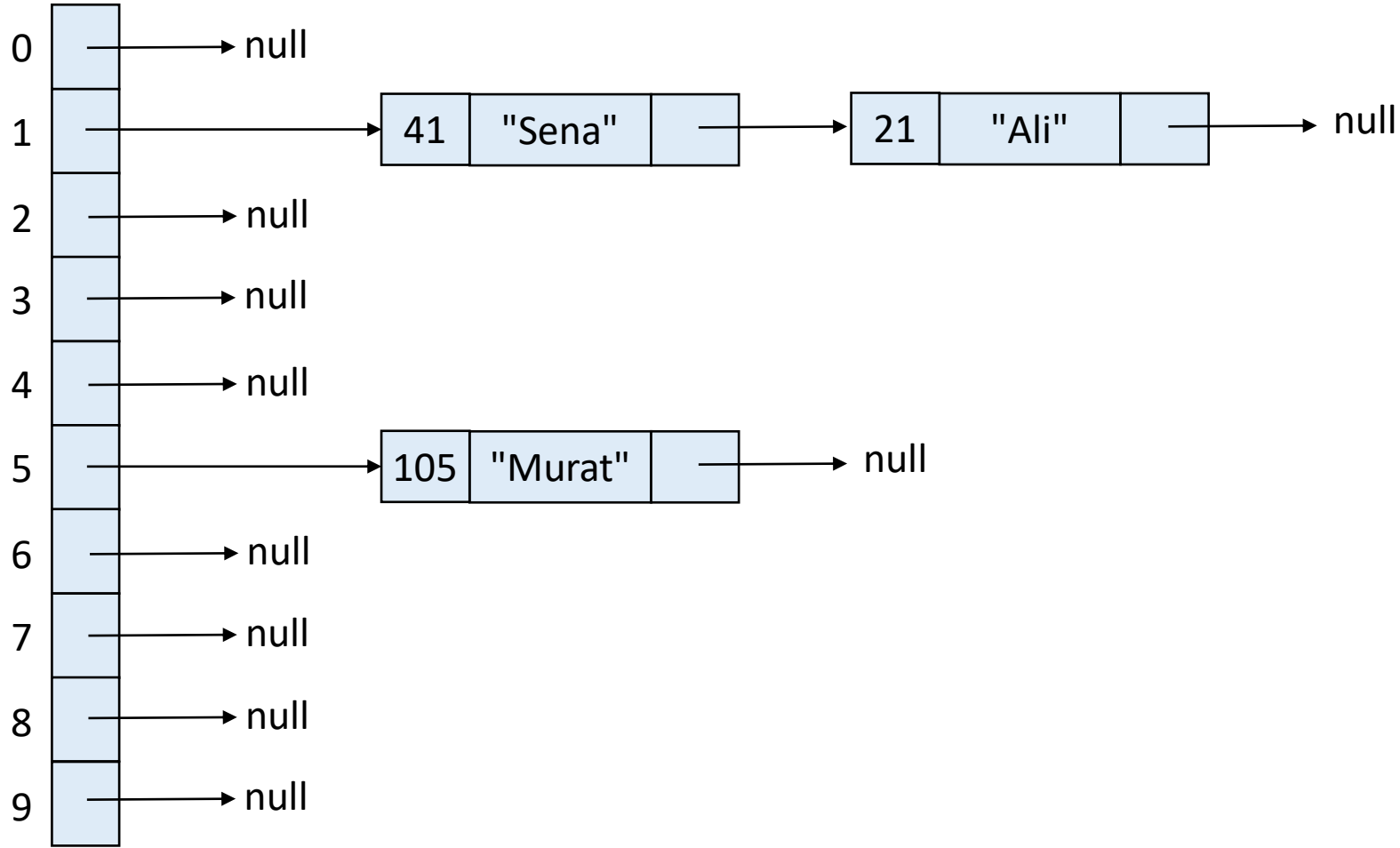


kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

```
tablo.getir(105);
```



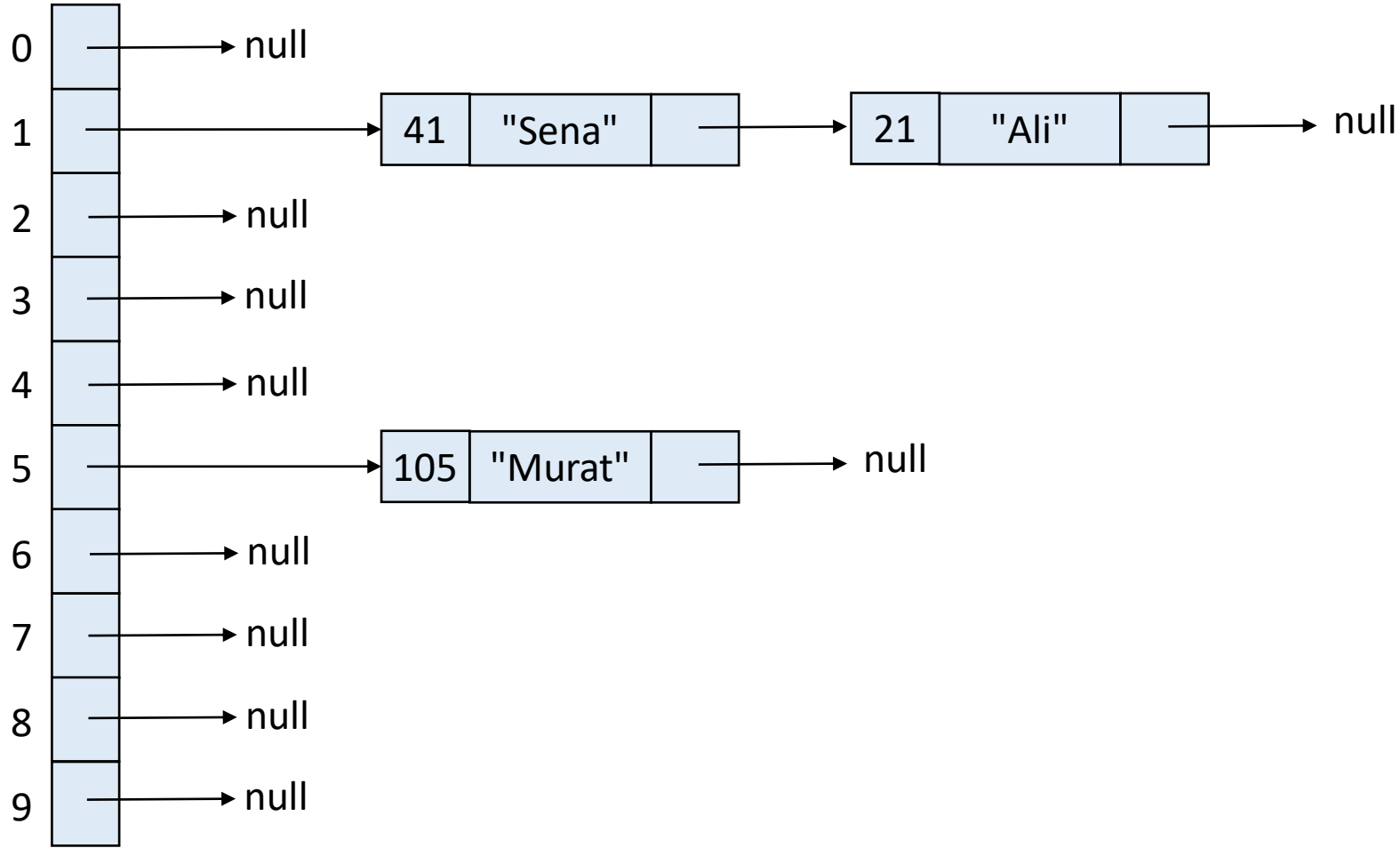
kovaSayisi = 10
buyukluk = 3



kovaSayisi = 10
buyukluk = 3

↑
HashDugumu[] kovalar

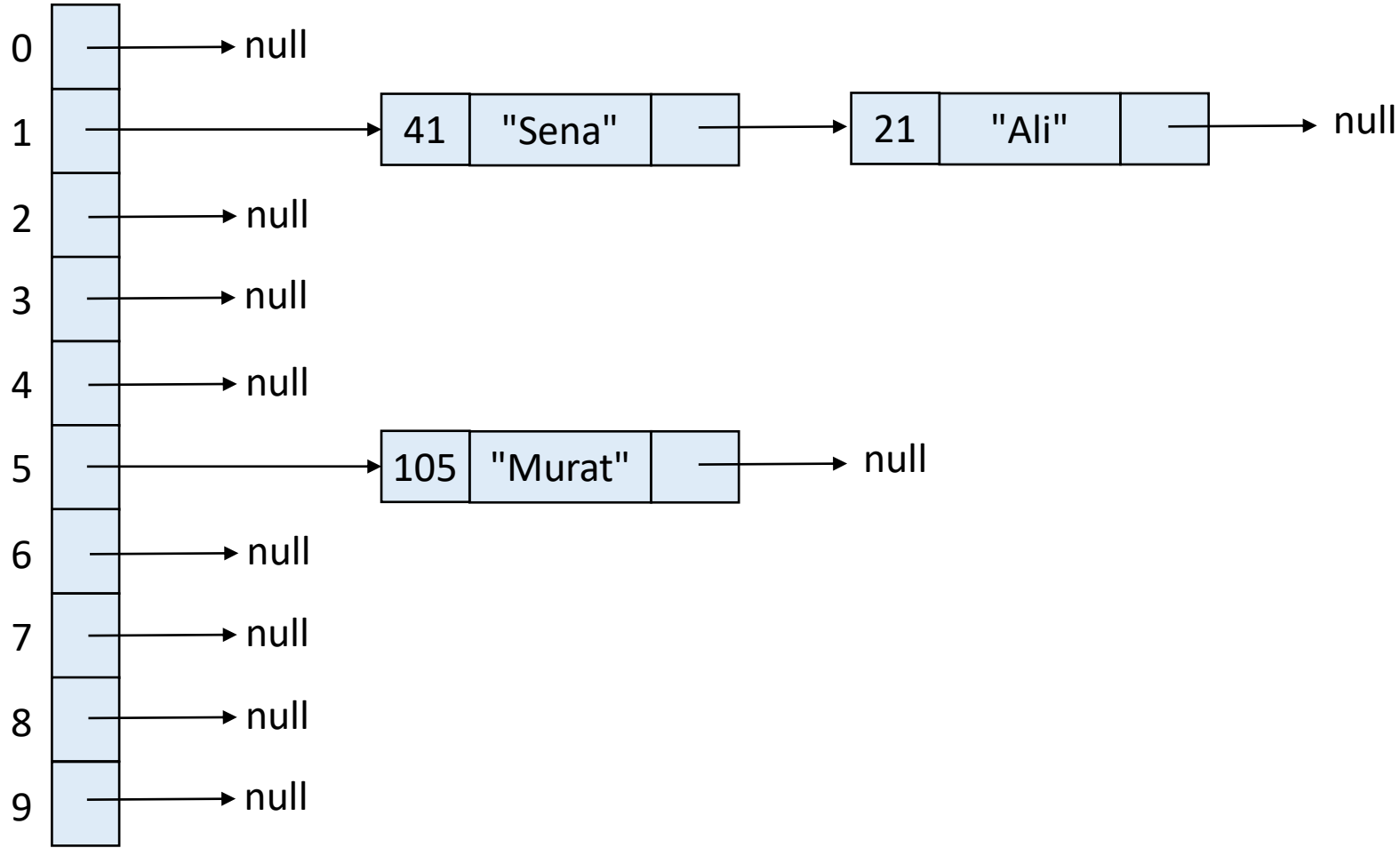
```
tablo.getir(21);
```



kovaSayisi = 10
buyukluk = 3
anahtar = 21

↑
HashDugumu[] kovalar

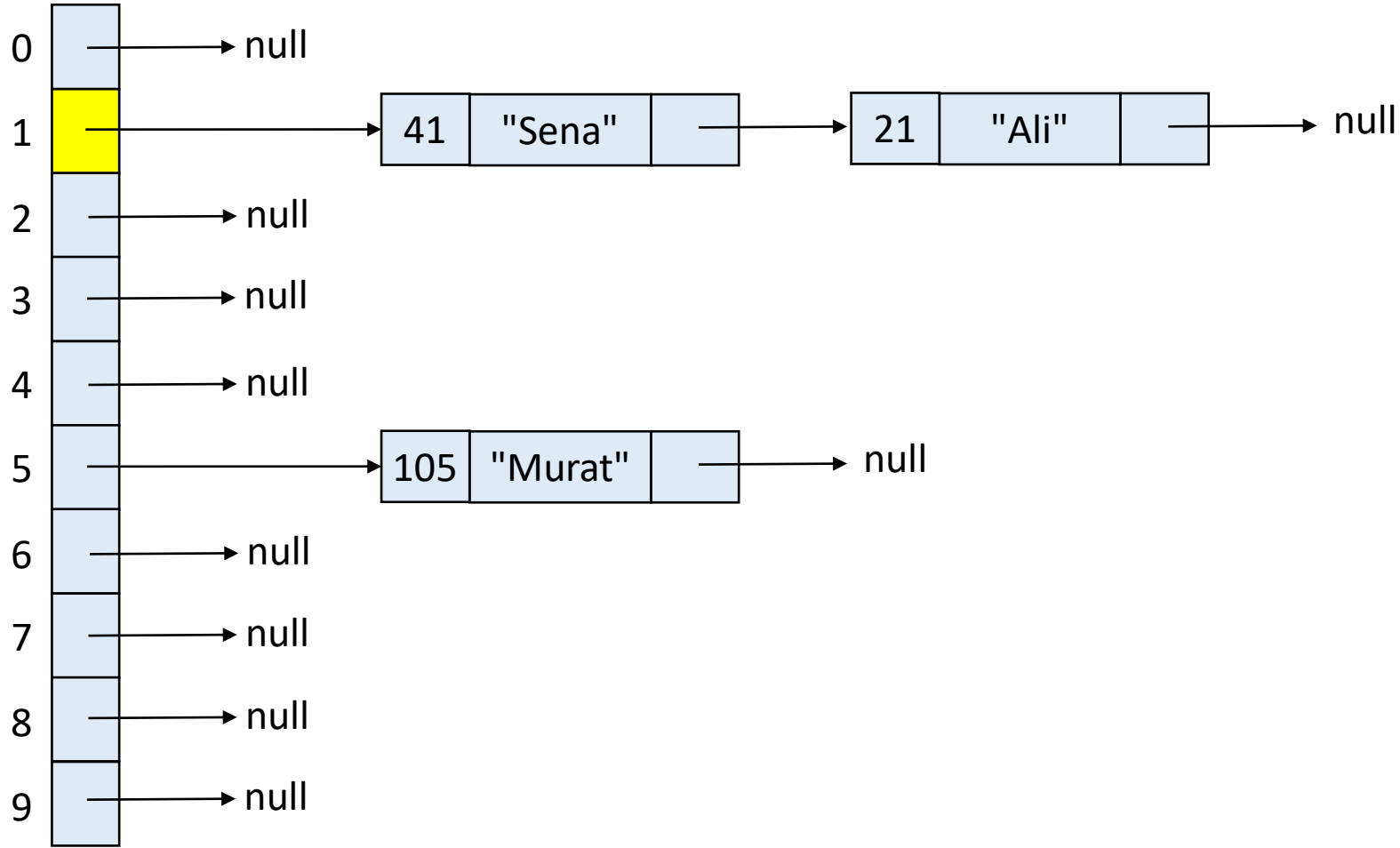
```
tablo.getir(21);
```



kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

↑
HashDugumu[] kovalar

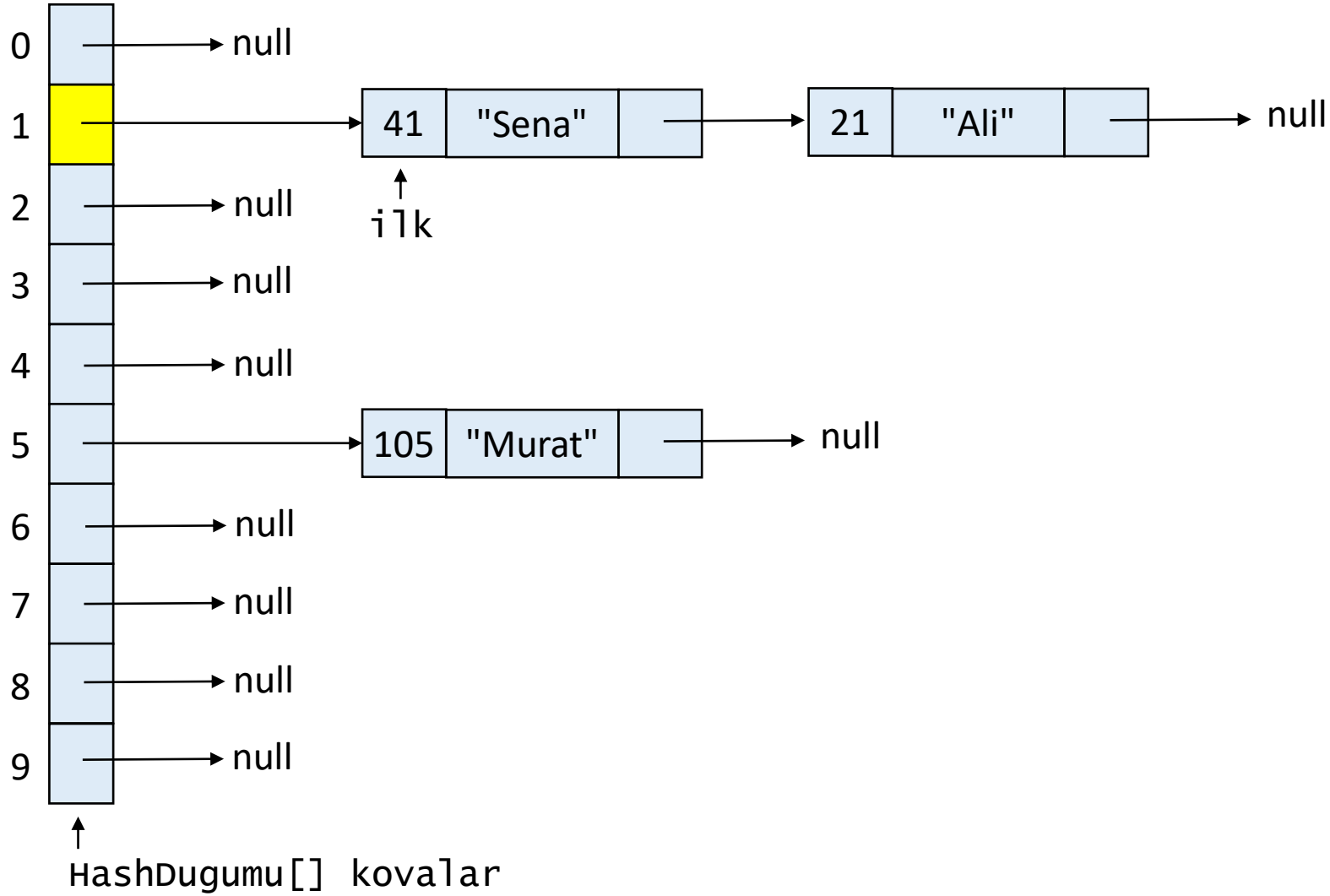
tablo.getir(21);



kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

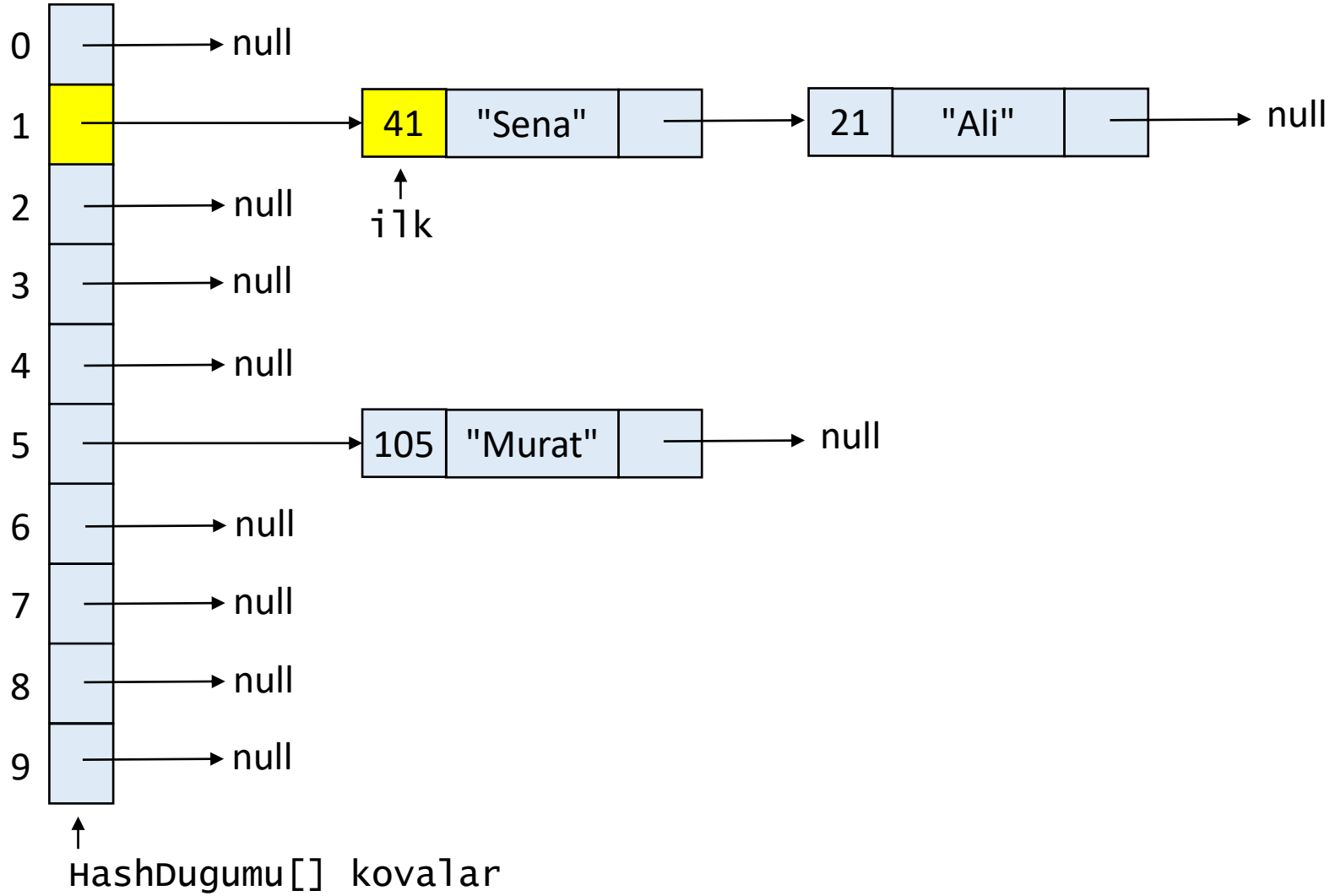
↑
HashDugumu[] kovalar

tablo.getir(21);



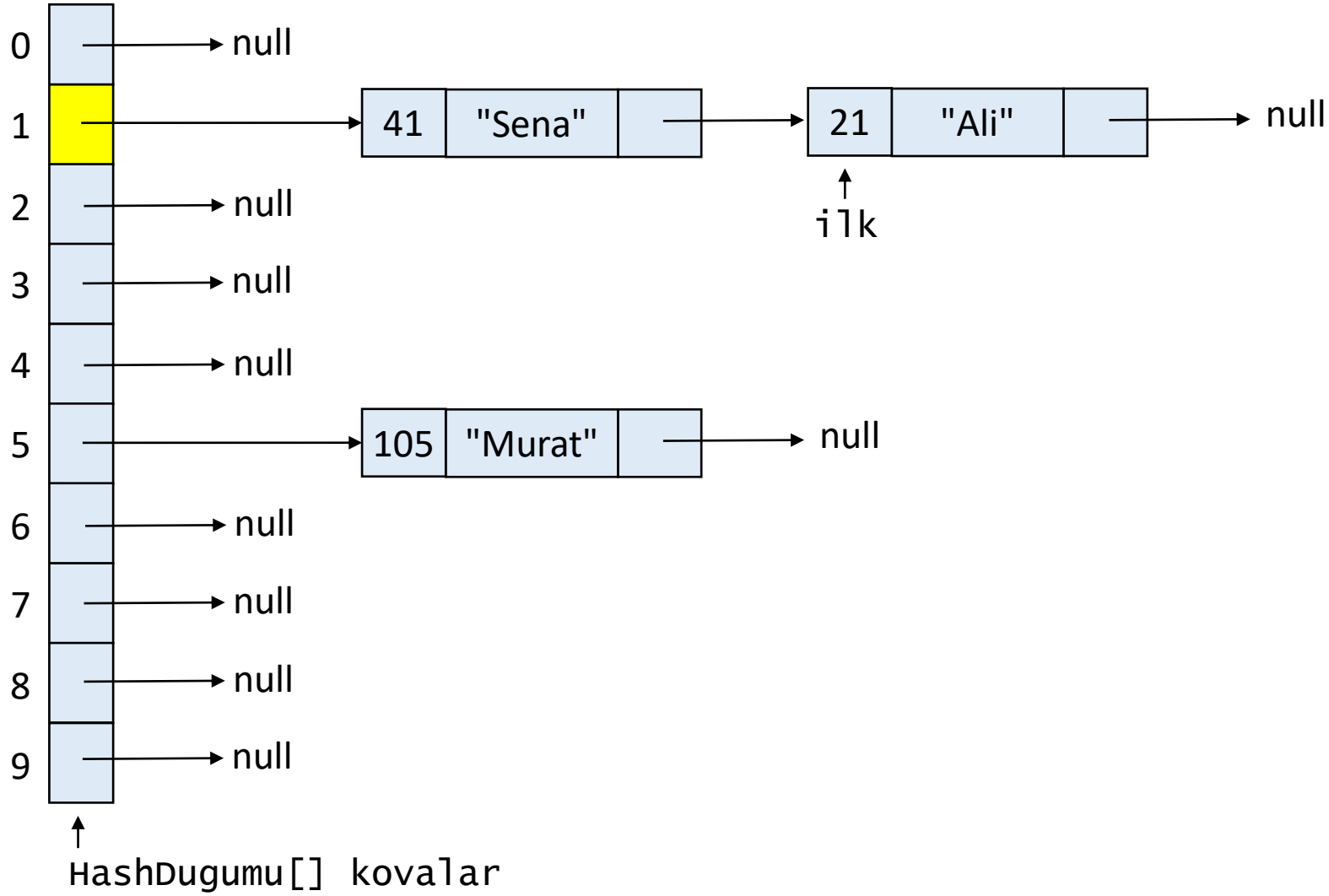
kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

```
tablo.getir(21);
```



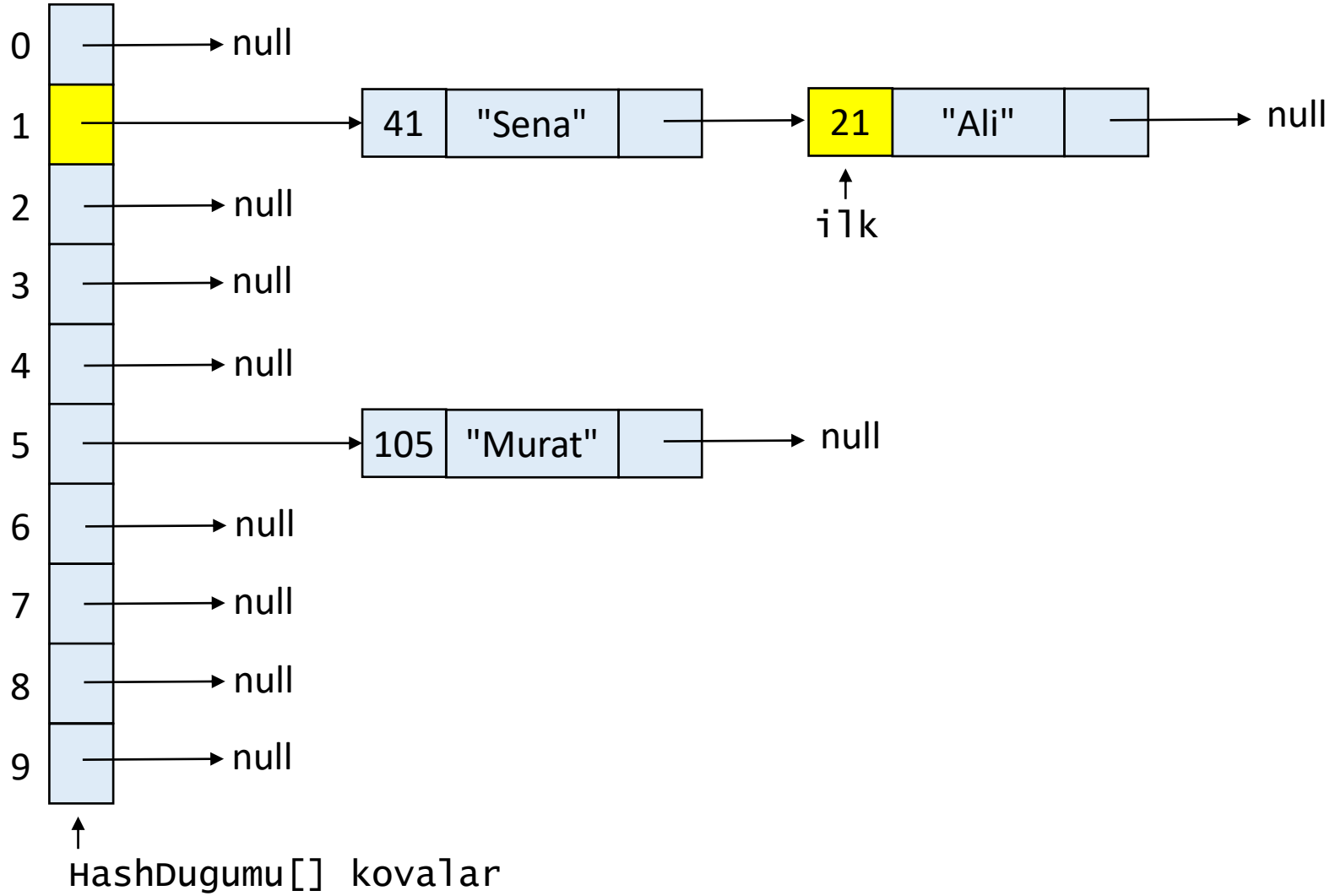
kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

```
tablo.getir(21);
```



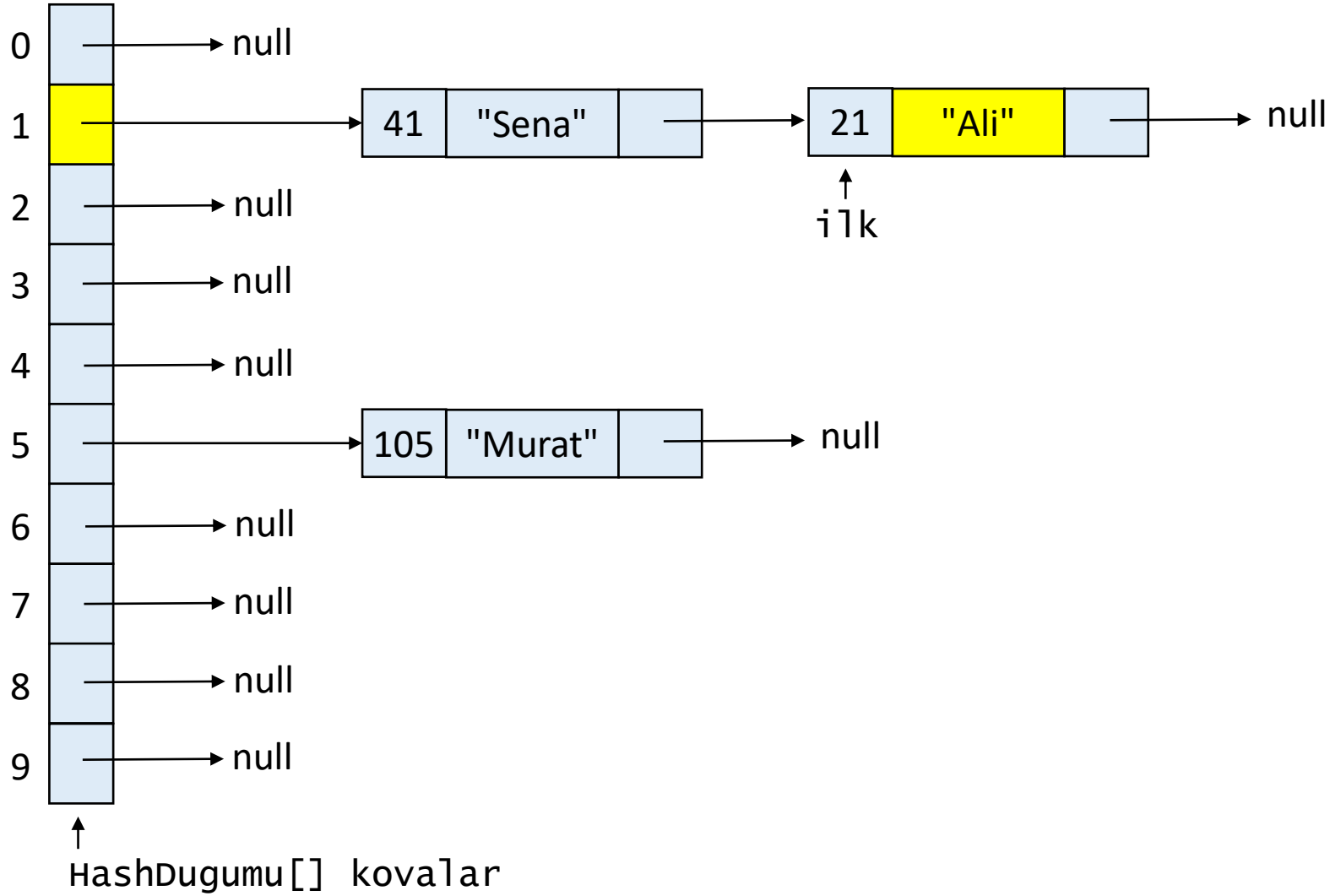
kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

```
tablo.getir(21);
```



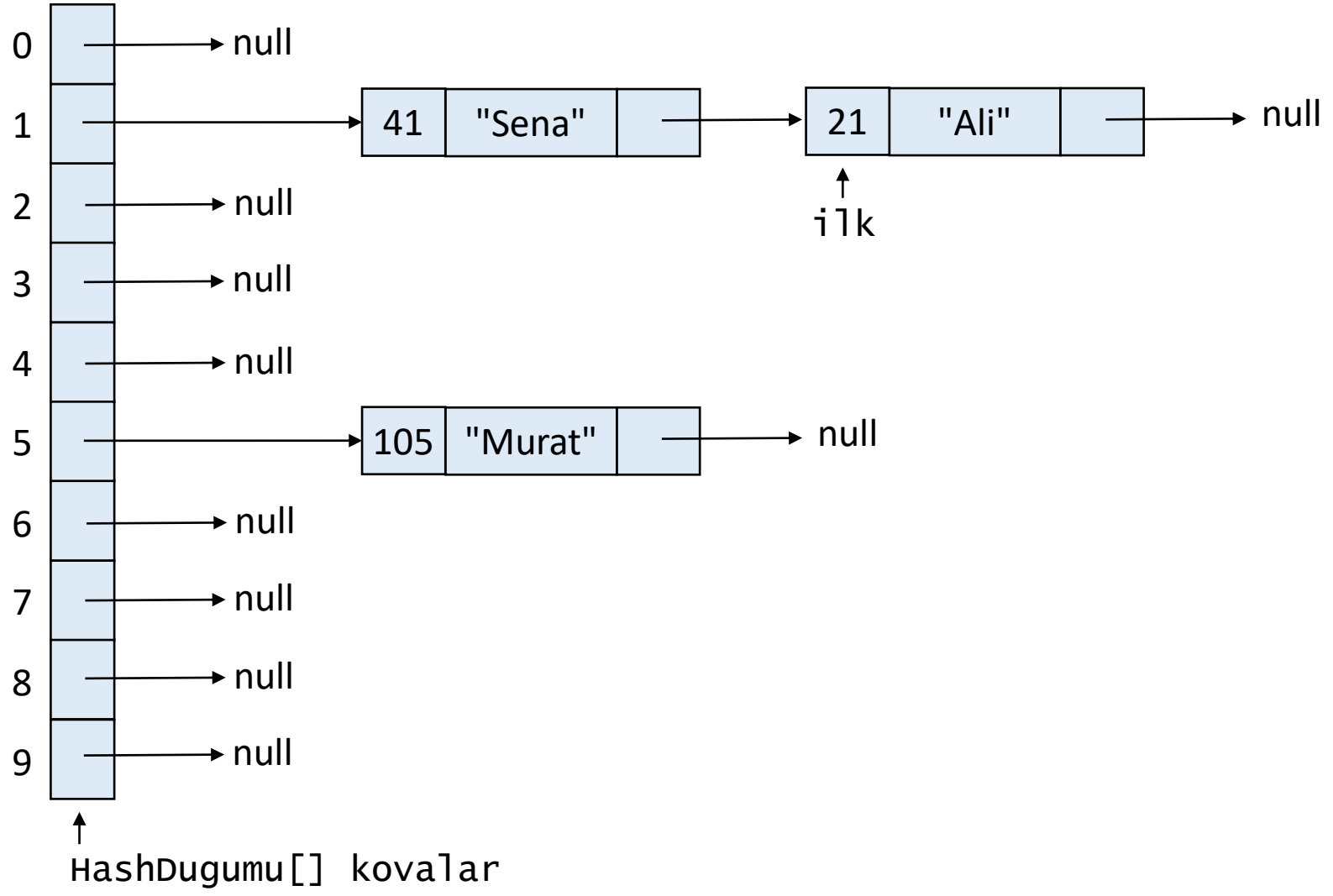
kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

```
tablo.getir(21);
```

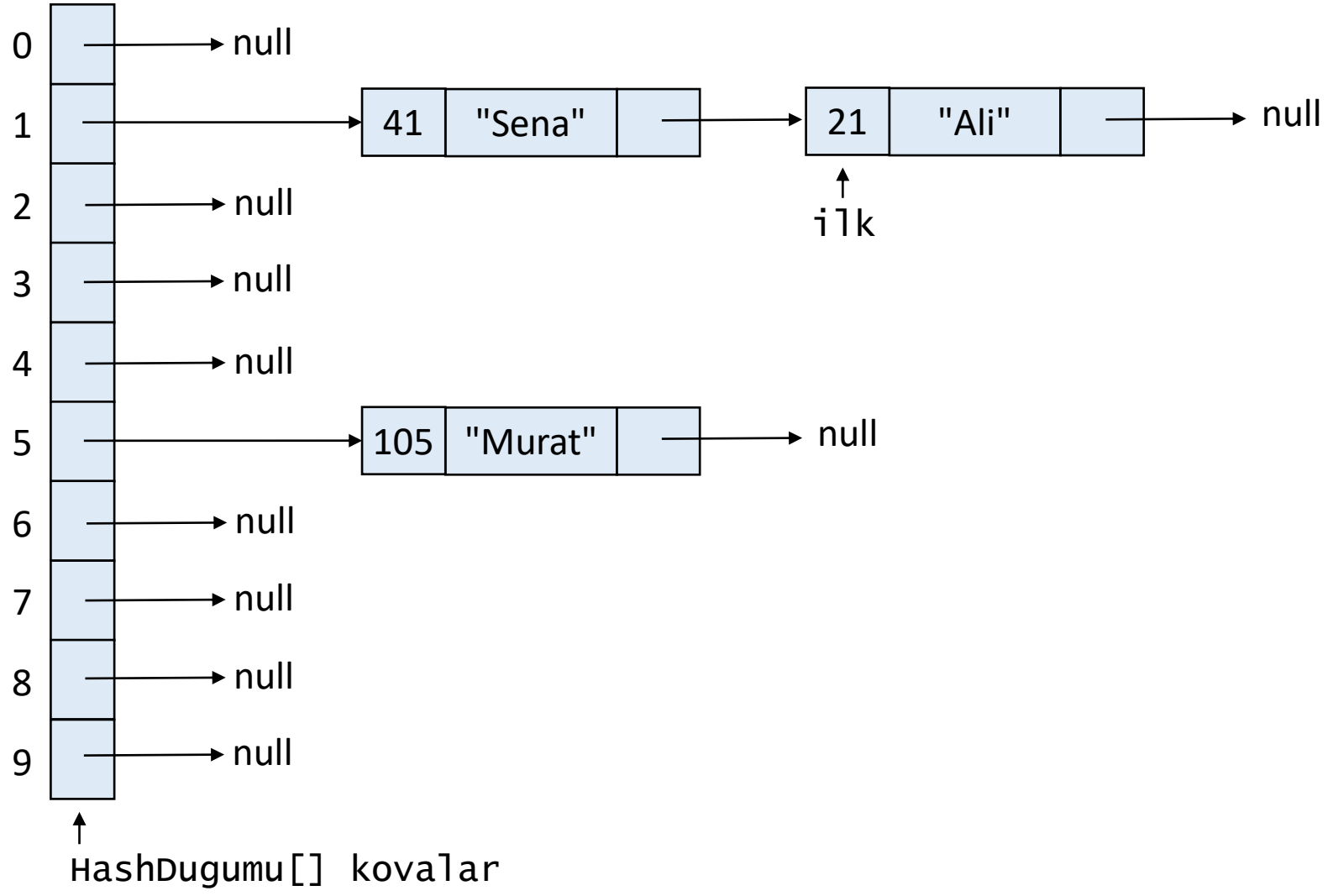


kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1

```
tablo.getir(21);
```

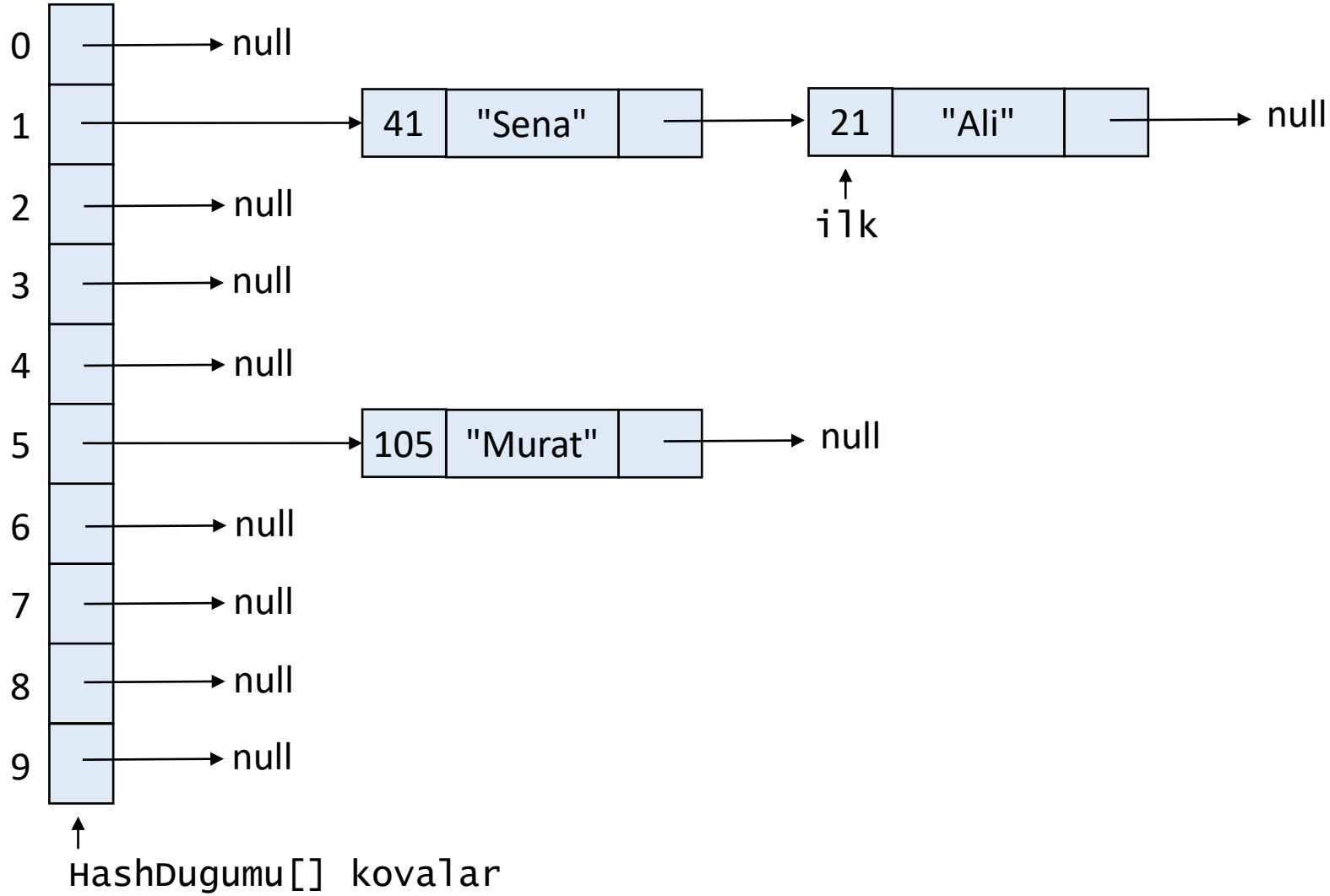


kovaSayisi = 10
buyukluk = 3



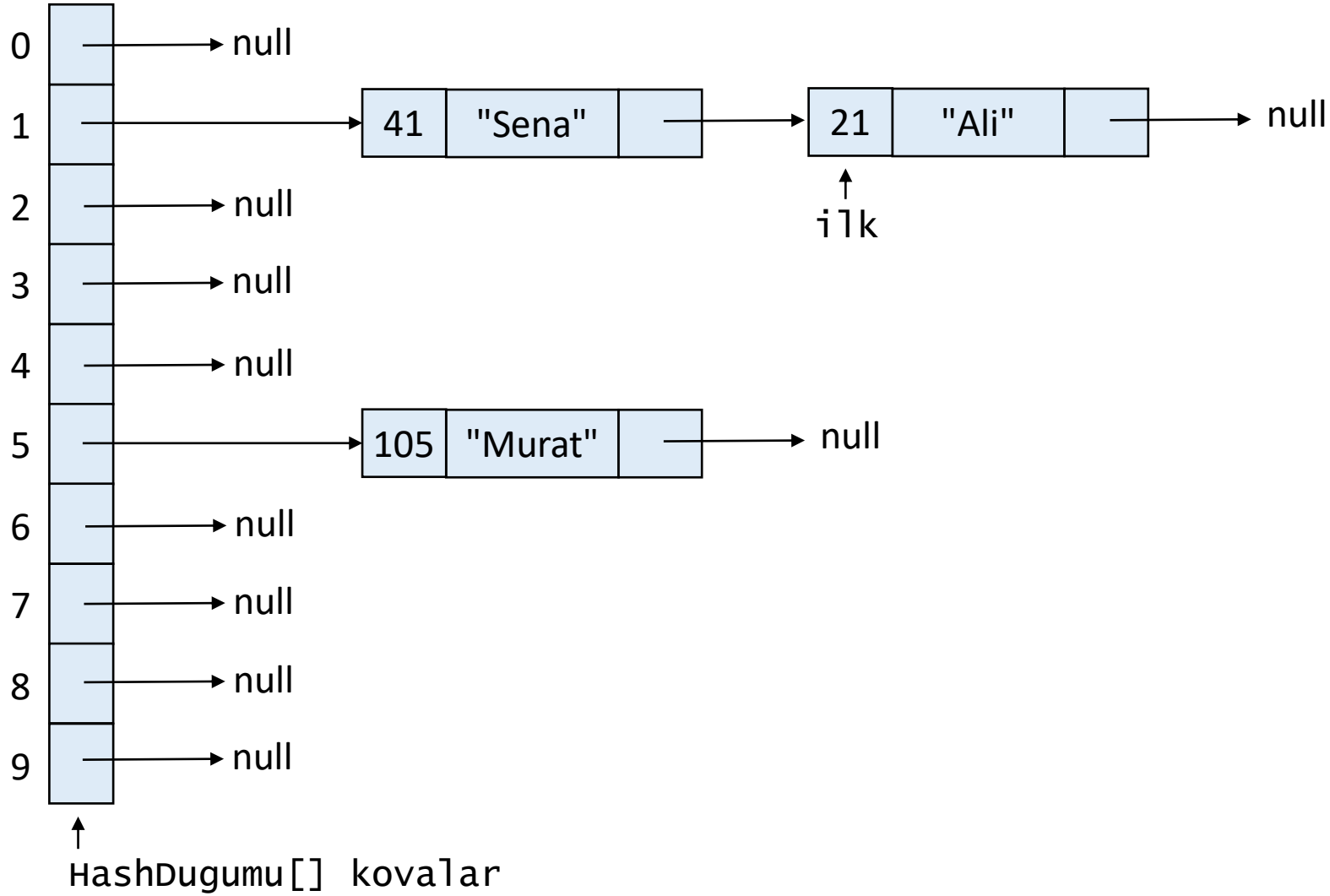
kovaSayisi = 10
buyukluk = 3

```
tablo.getir(88);
```



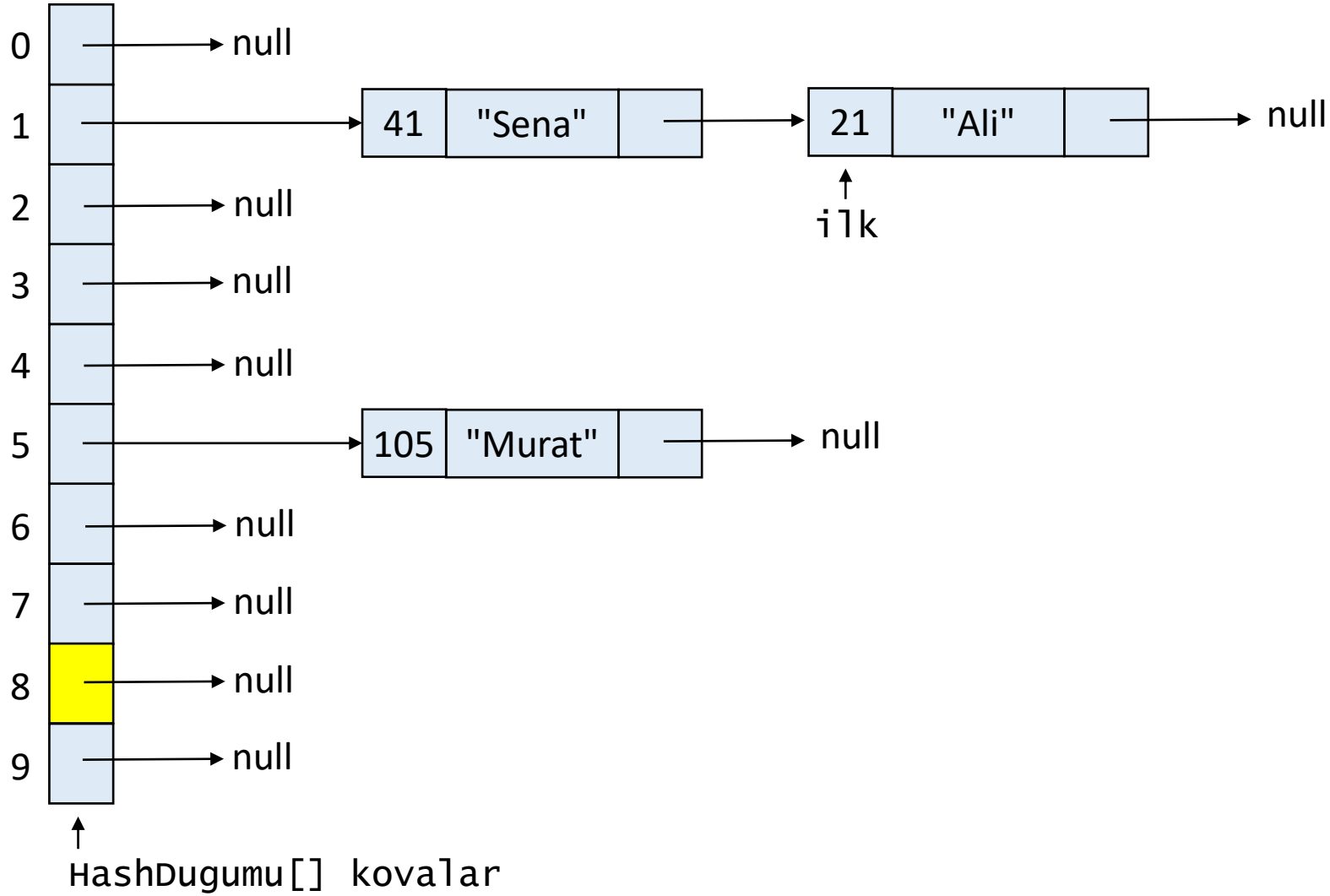
kovaSayisi = 10
buyukluk = 3
anahtar = 88

```
tablo.getir(88);
```

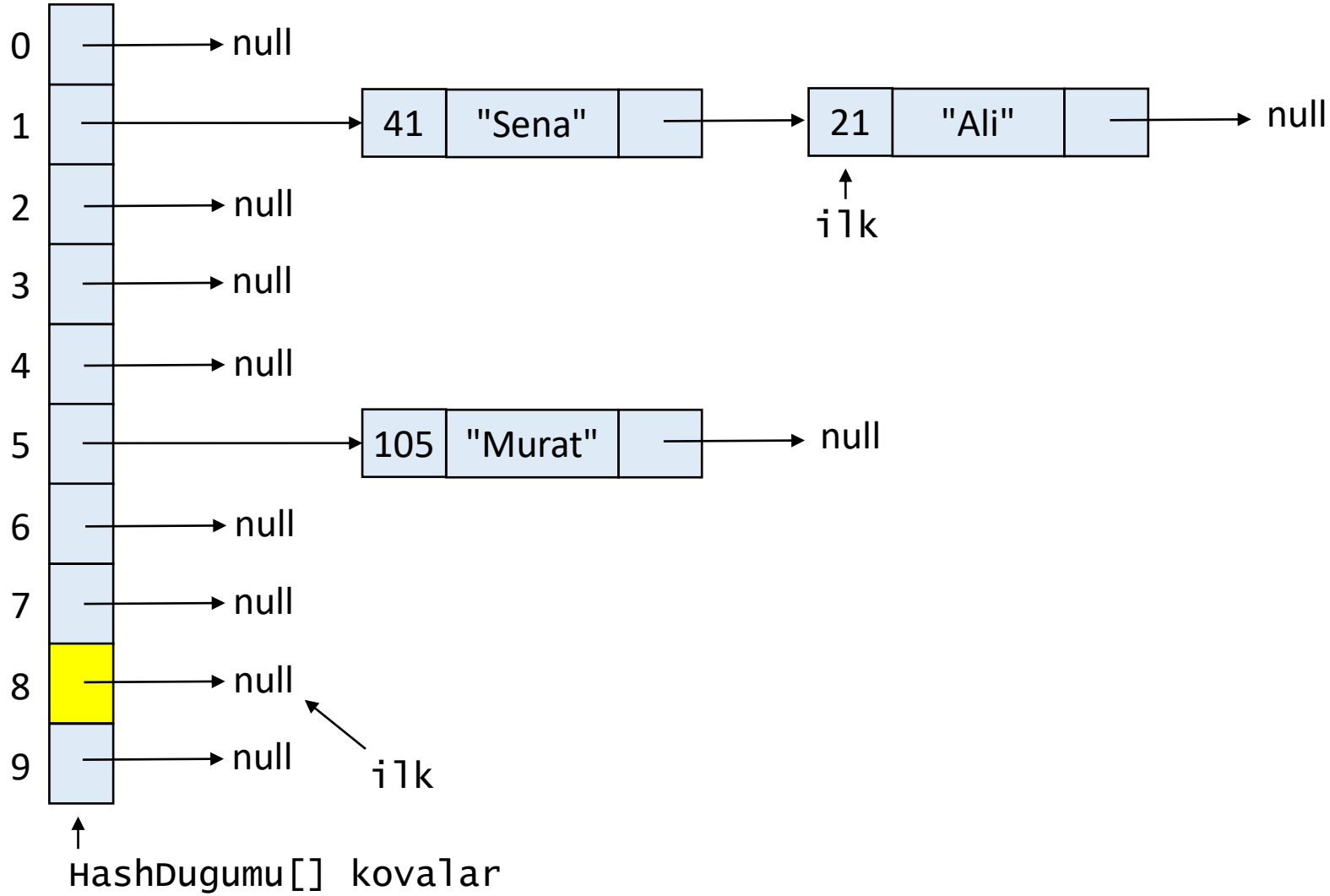
kovaSayisi = 10
buyukluk = 3
anahtar = 88
kovaIndeksi = 8

```
tablo.getir(88);
```



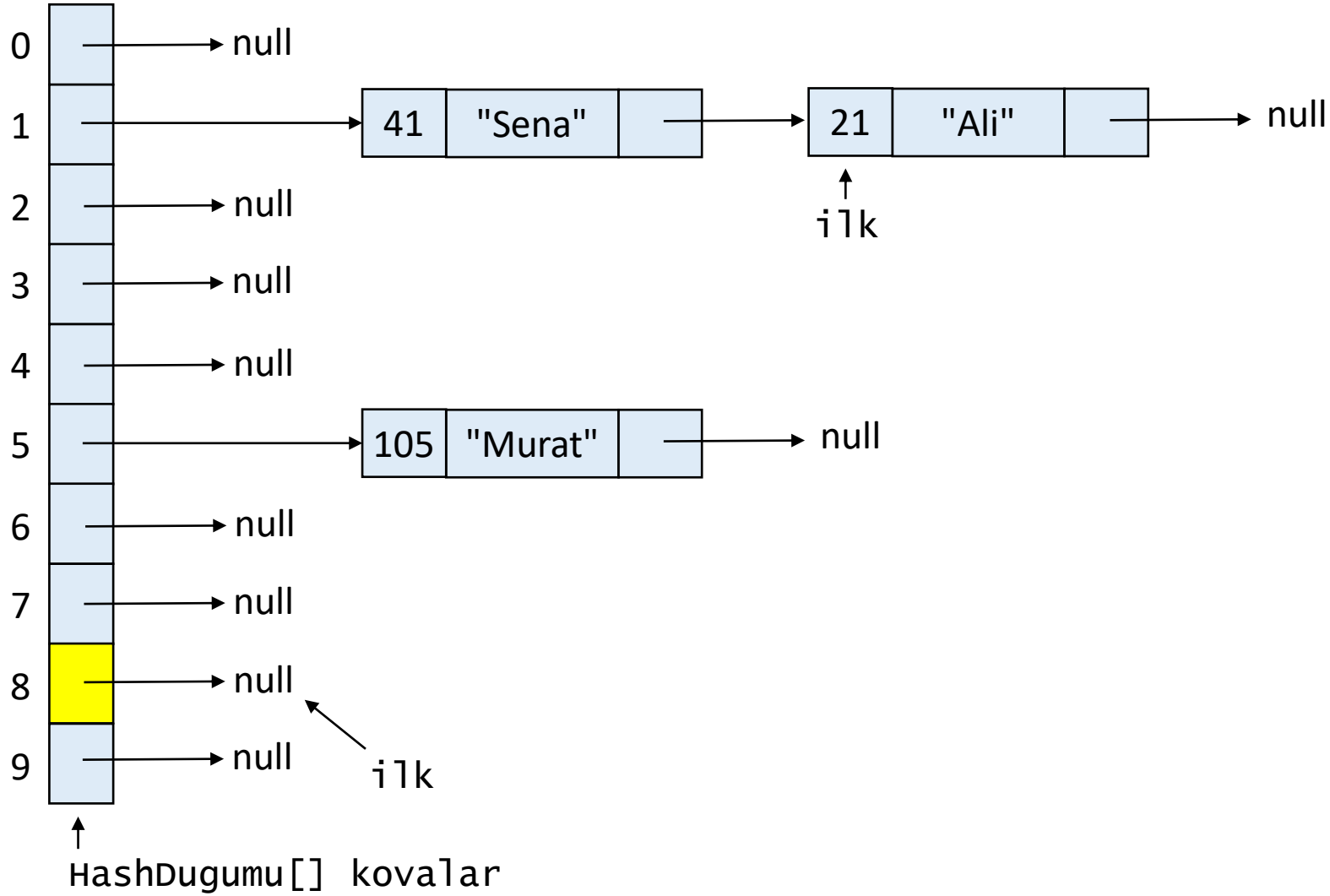
kovaSayisi = 10
buyukluk = 3
anahtar = 88
kovaIndeksi = 8

```
tablo.getir(88);
```



kovaSayisi = 10
buyukluk = 3
anahtar = 88
kovaIndeksi = 8

```
tablo.getir(88);
```

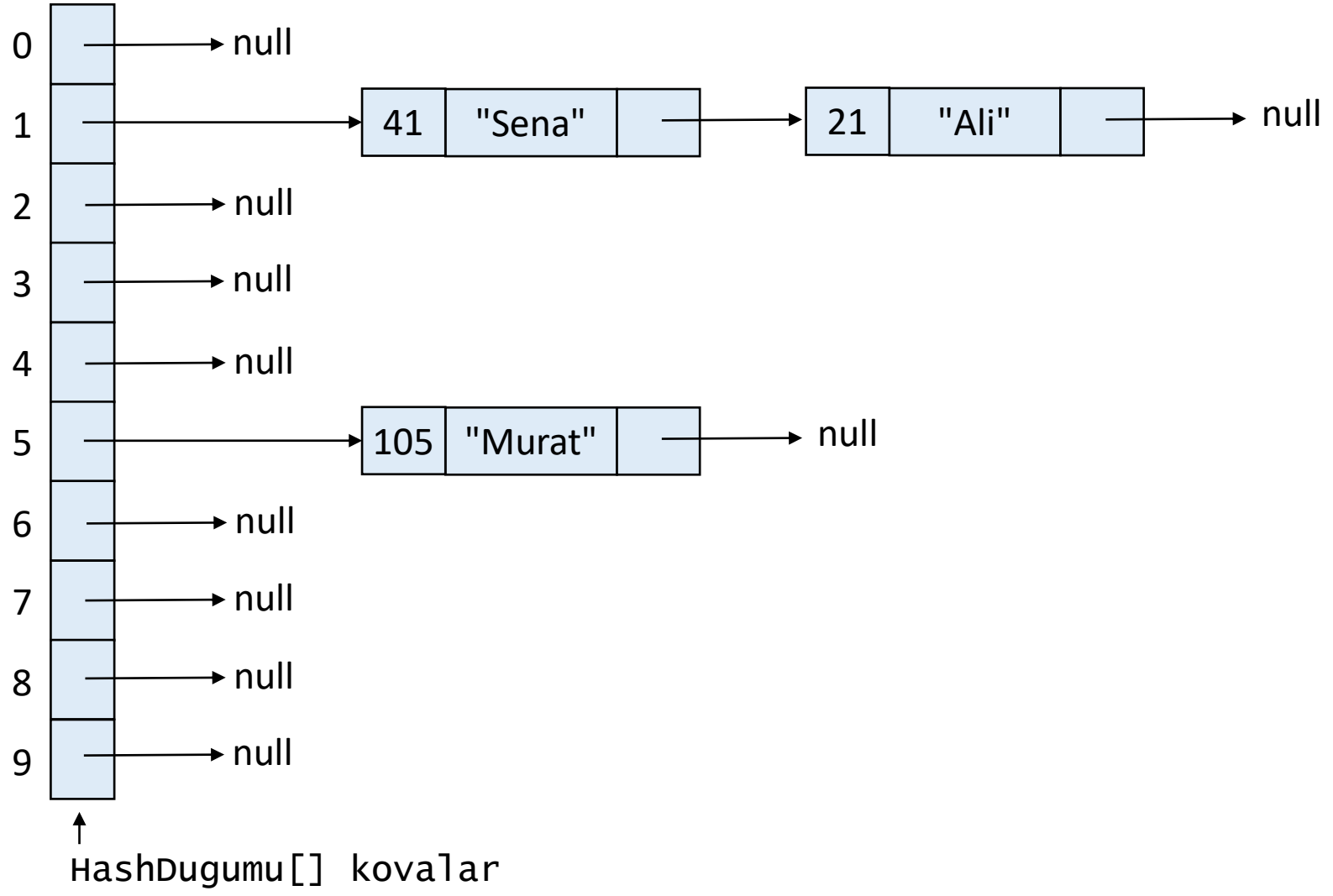


kovaSayisi = 10
buyukluk = 3
anahtar = 88
kovaIndeksi = 8

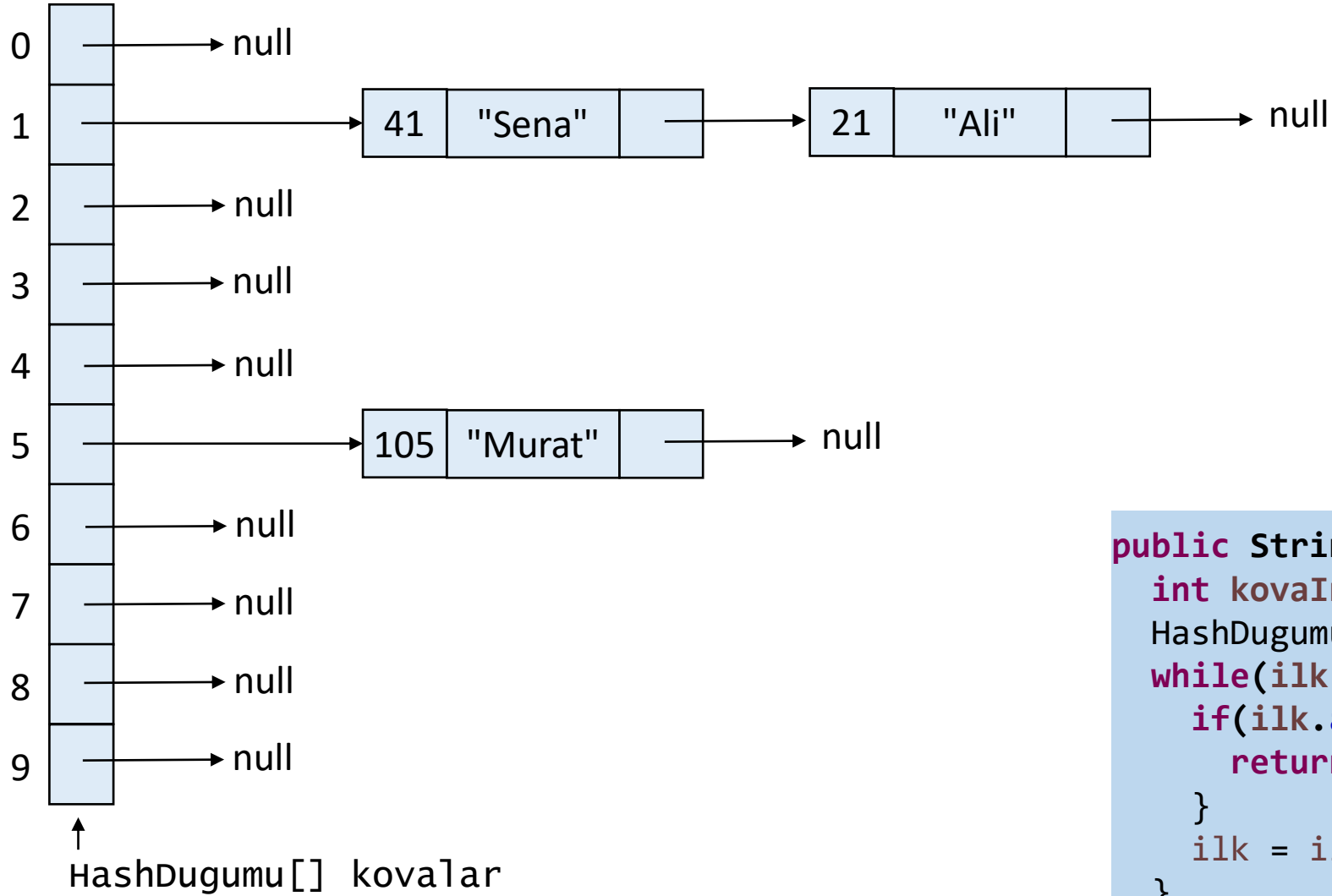
Eğer

- ilk null'a işaret ederse veya
 - ilk null'a erişirse
- anahtar bulunamamış demektir.

```
tablo.getir(88);
```

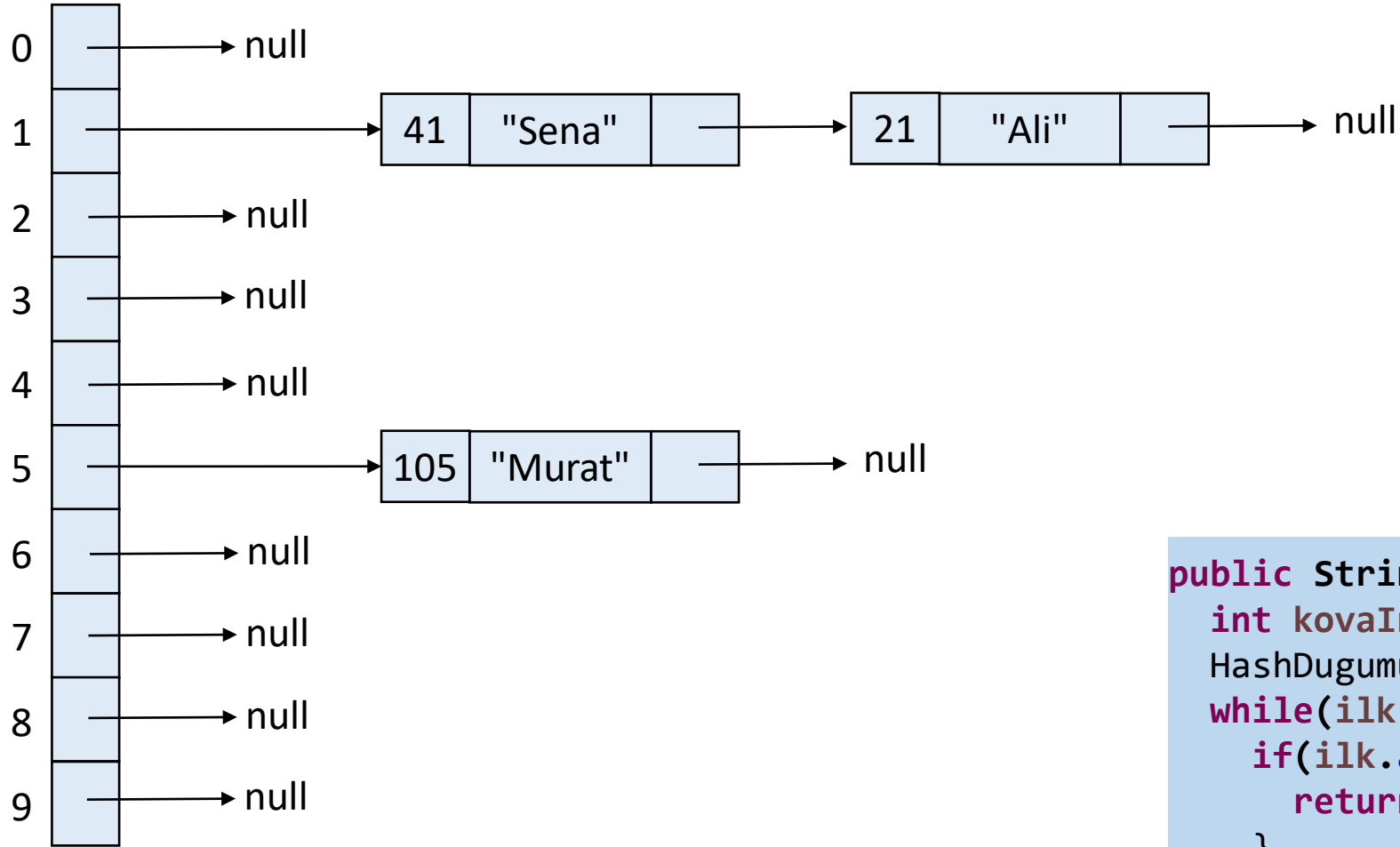


kovaSayisi = 10
buyukluk = 3



kovaSayisi = 10
buyukluk = 3

```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

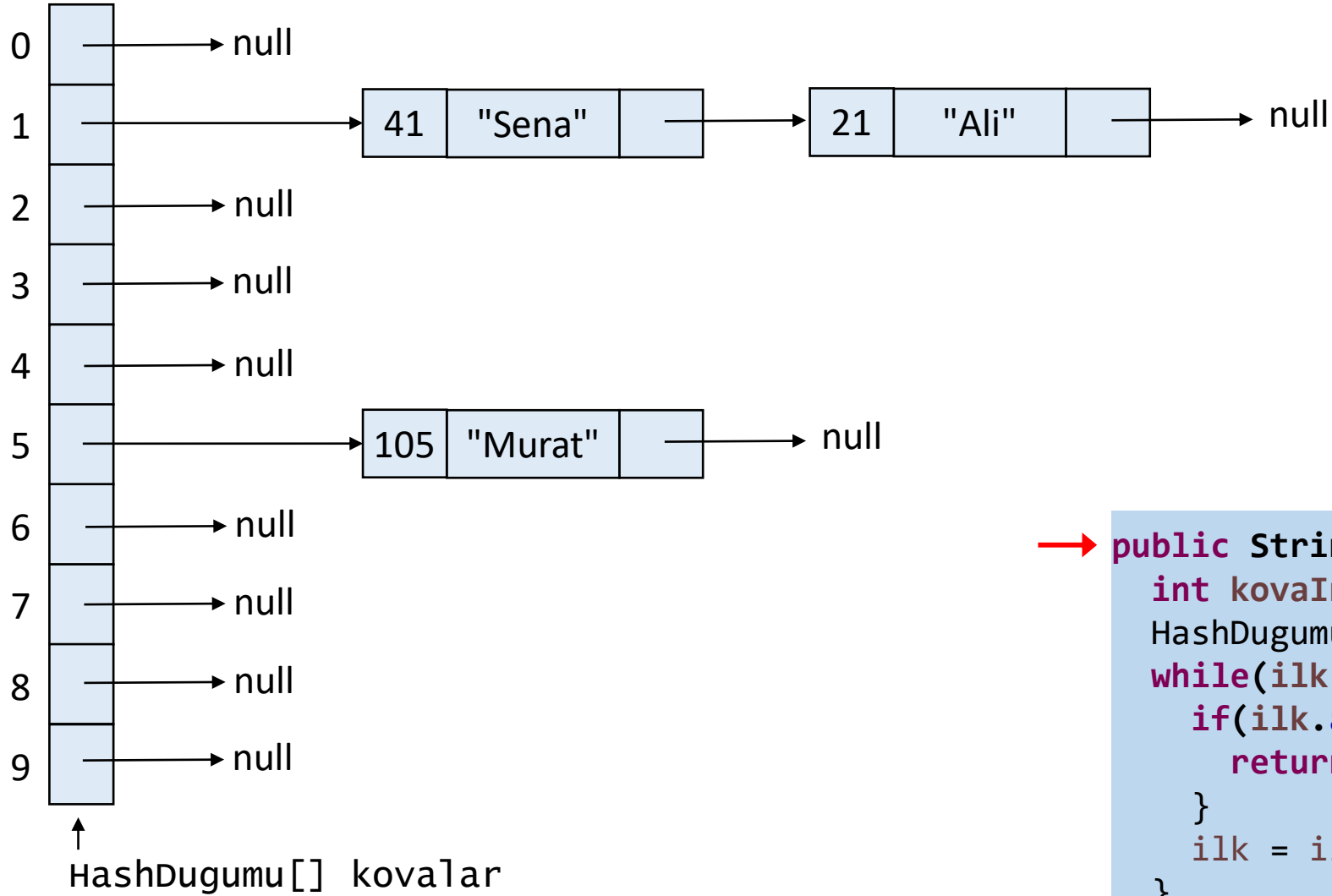


↑ HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 3

```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(105);



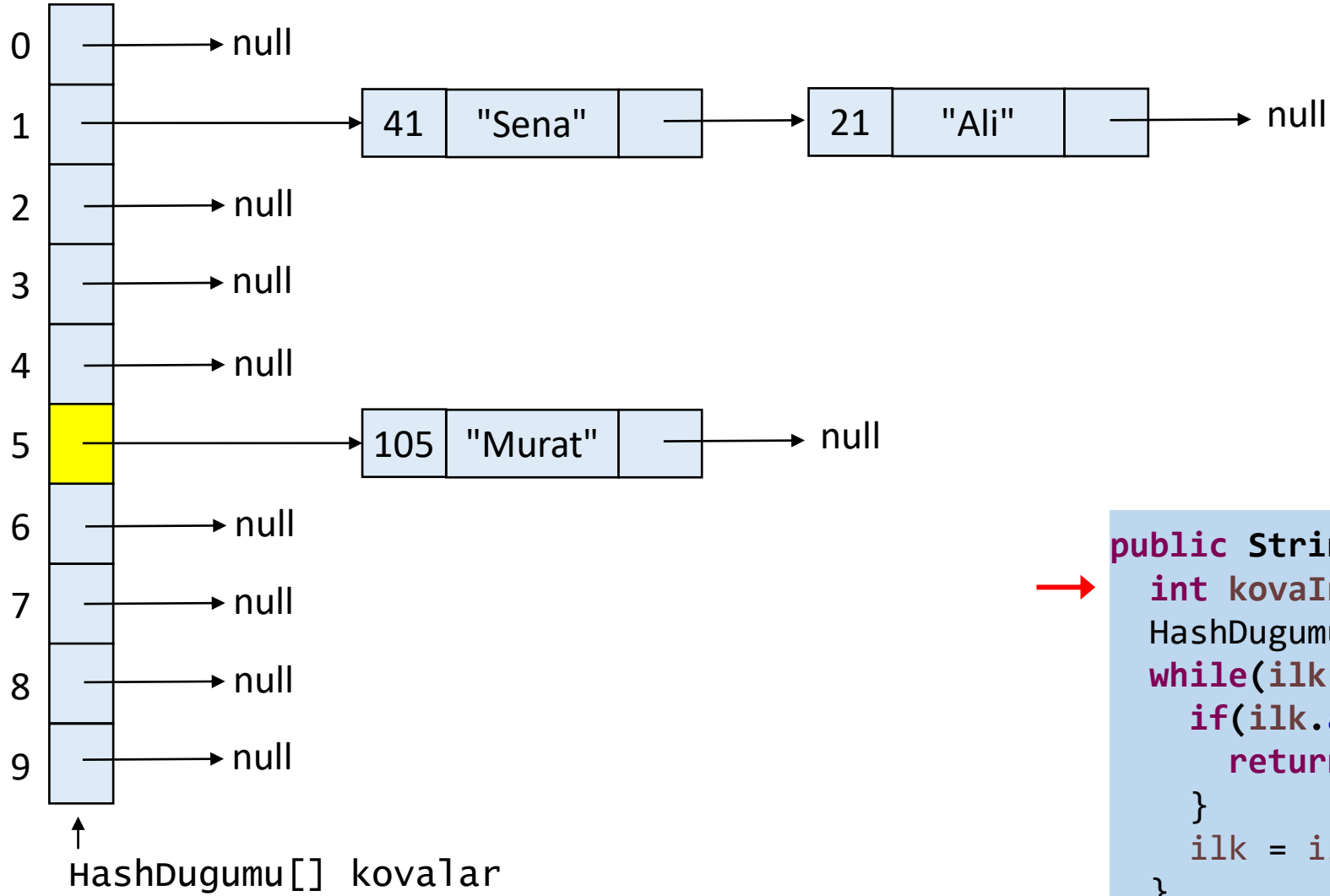
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105

```

→ public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}

```

tablo.getir(105);

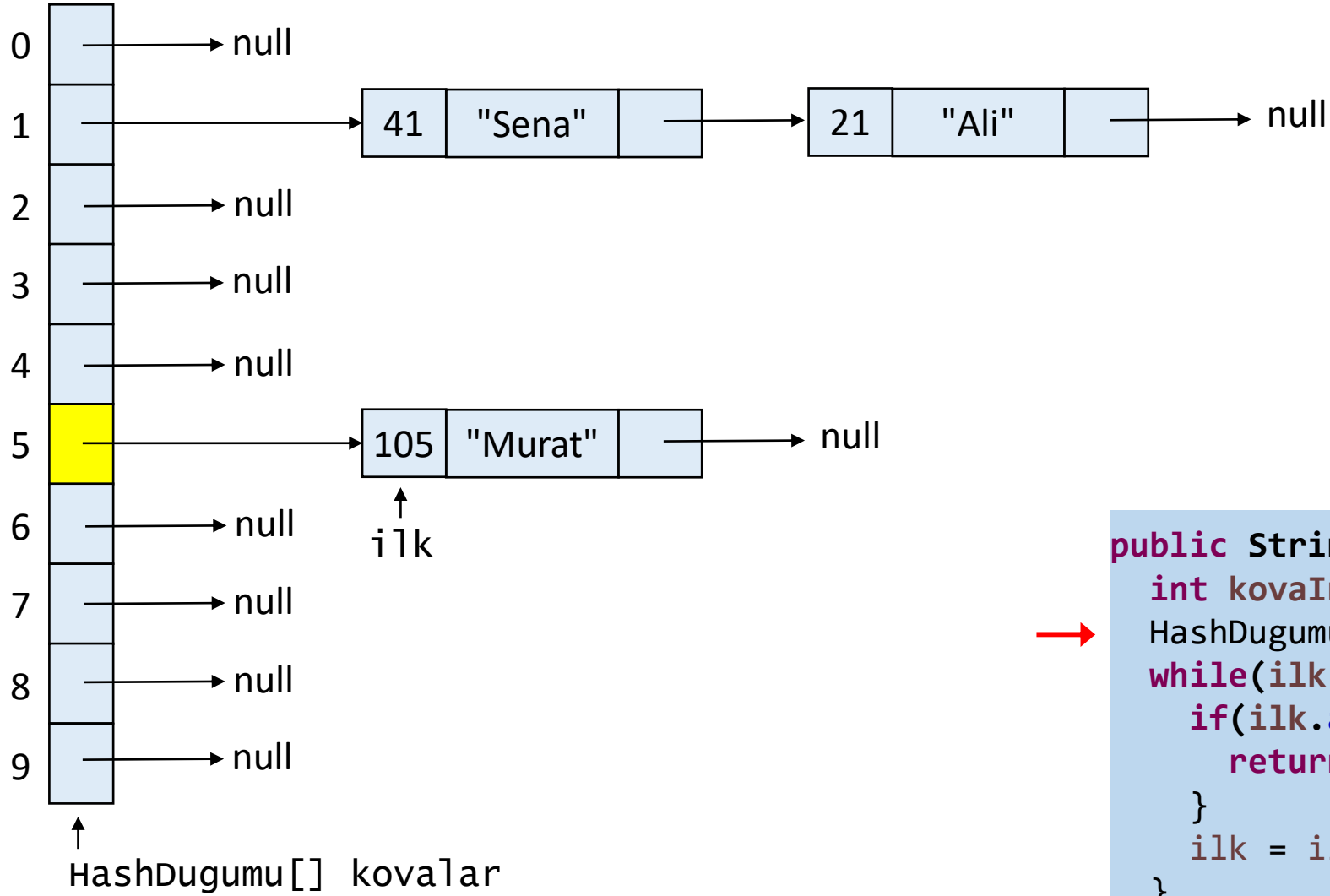


kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(105);

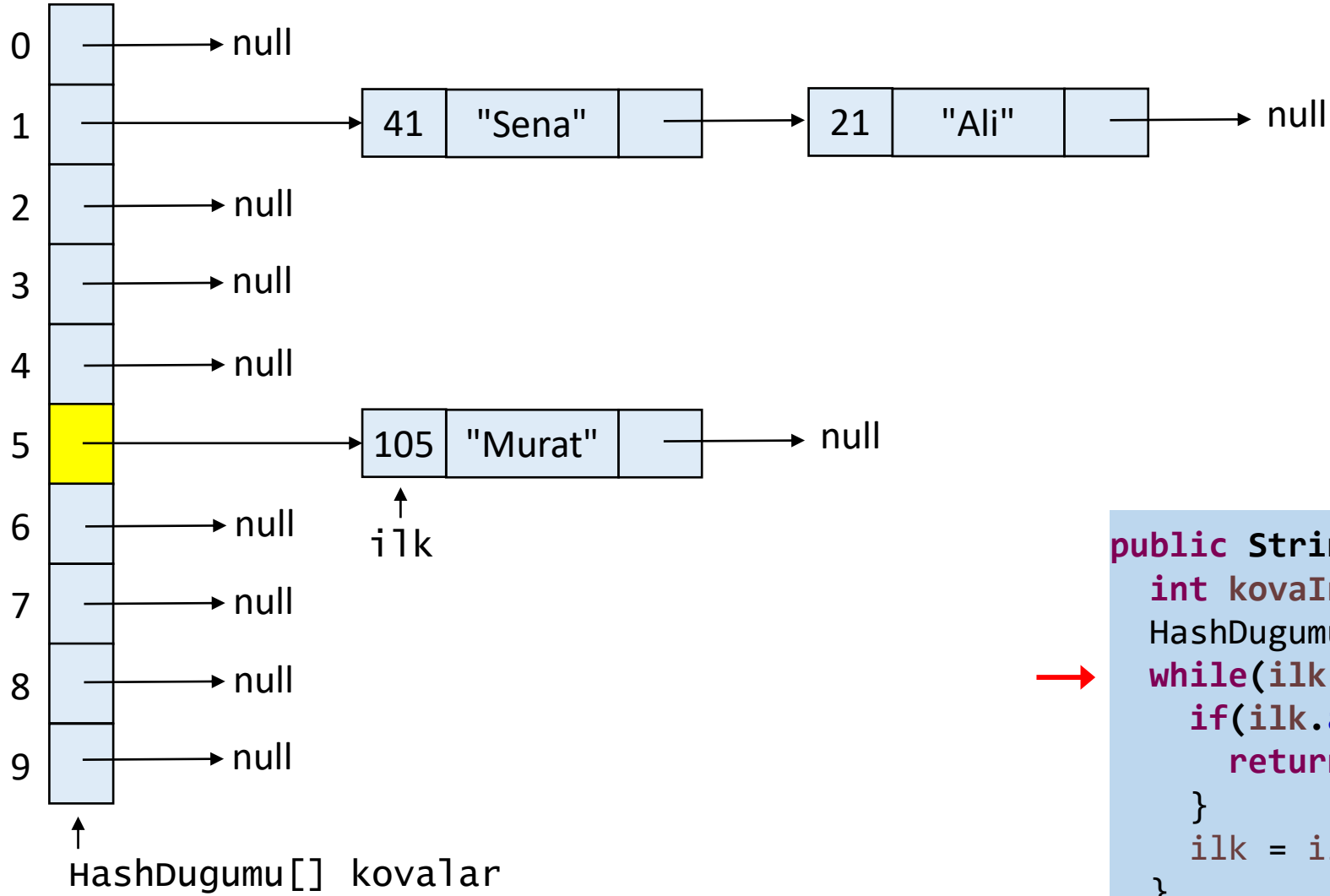


kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(105);

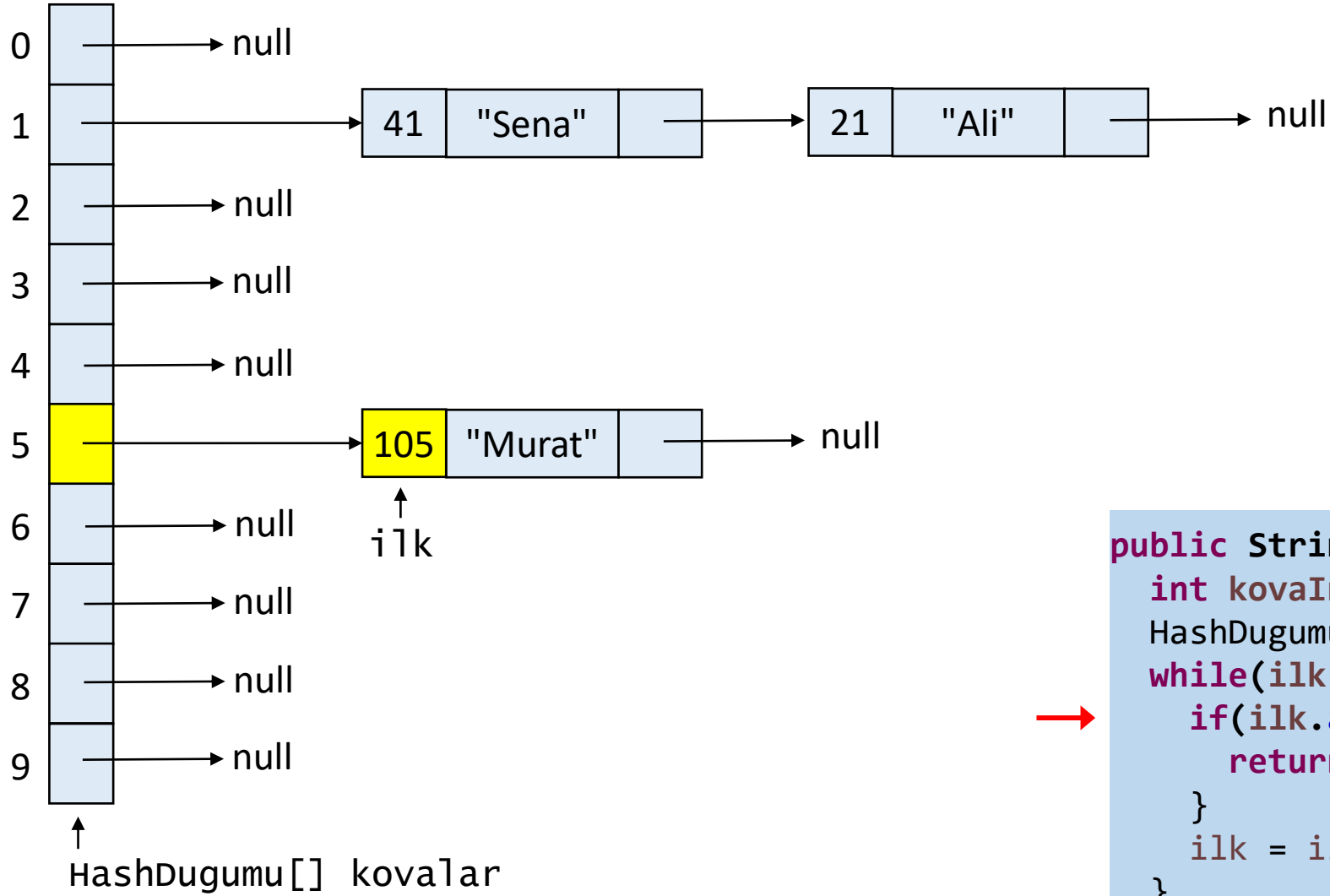


kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(105);

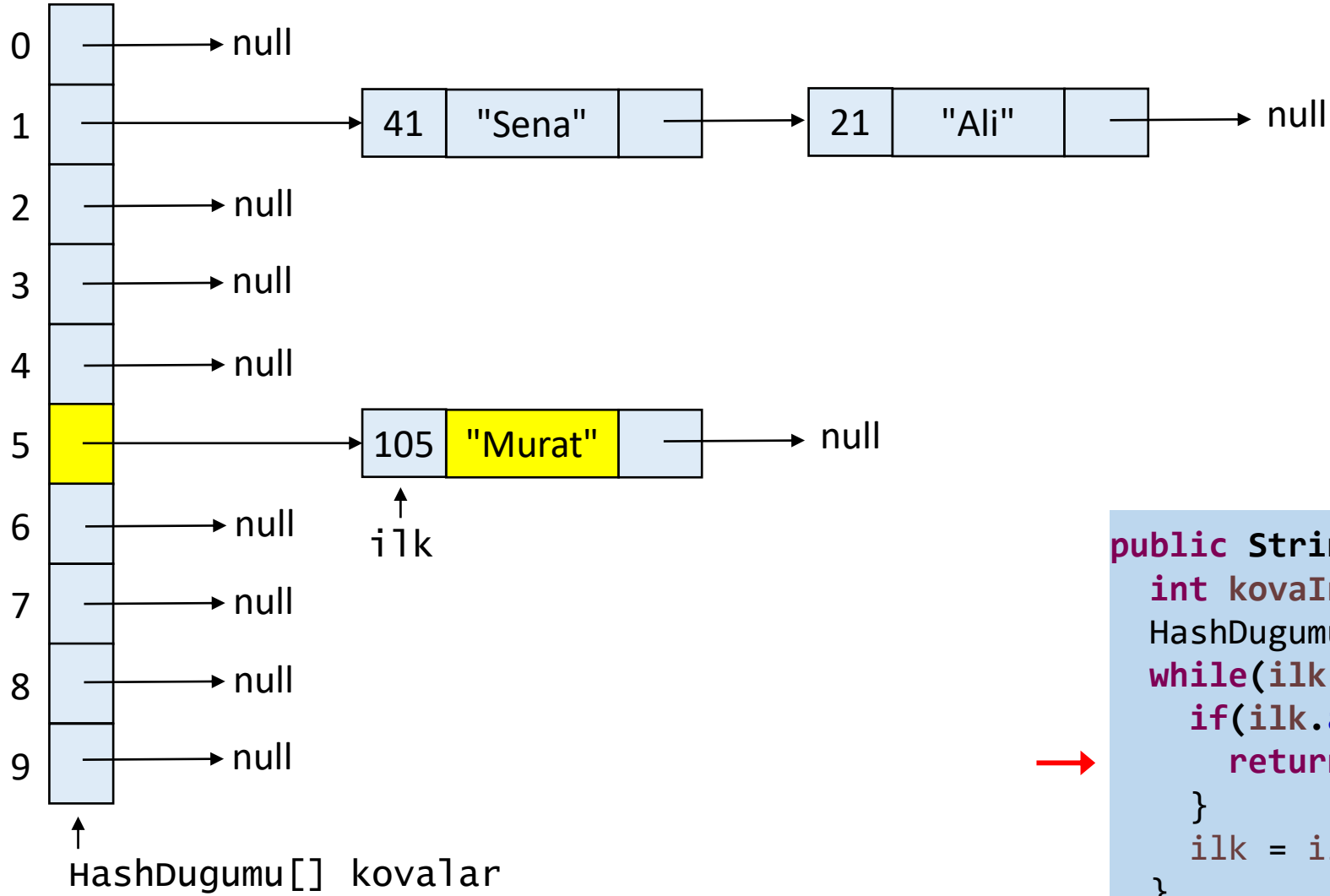


kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5



```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(105);

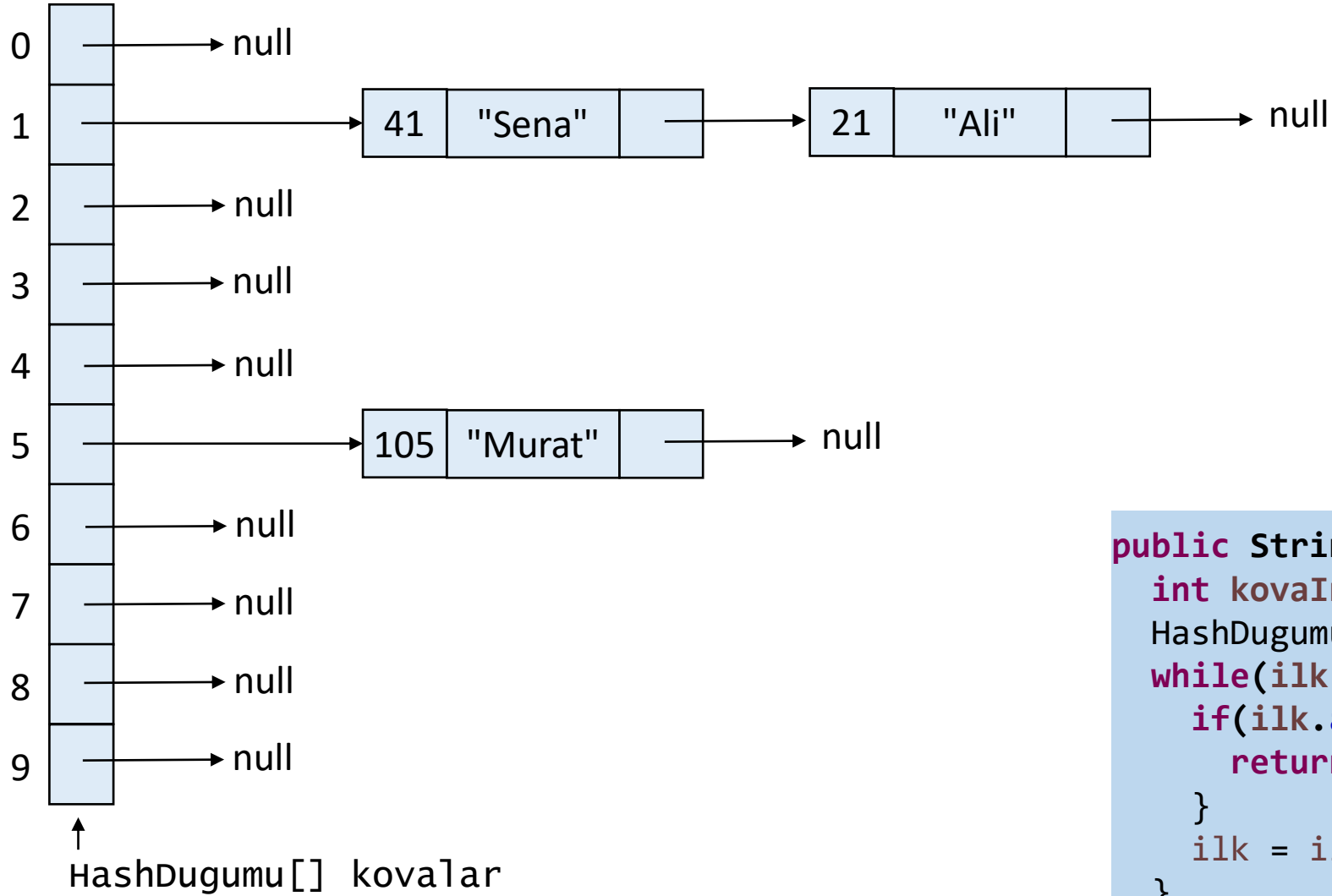


kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5



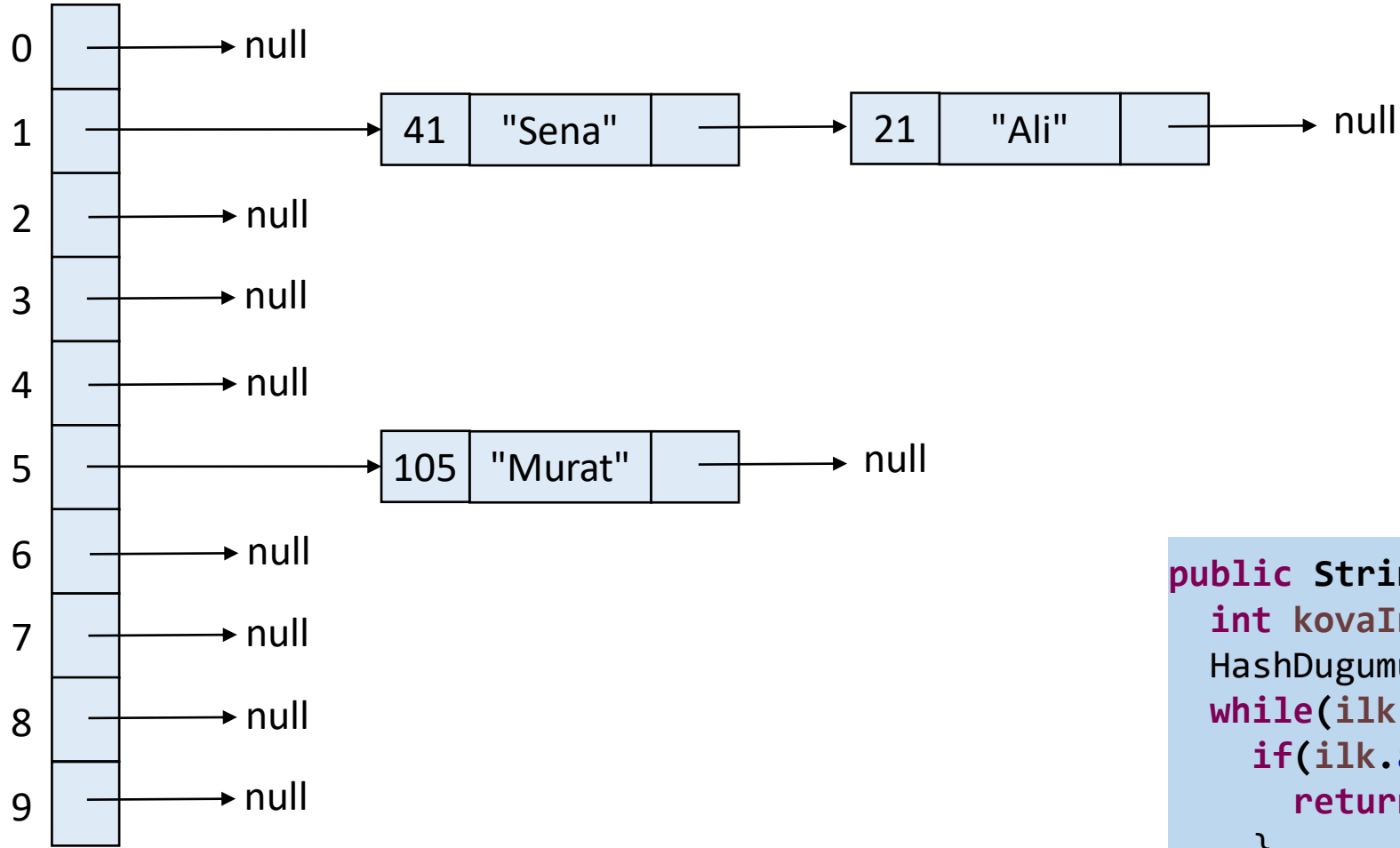
```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(105);



kovaSayisi = 10
buyukluk = 3

```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

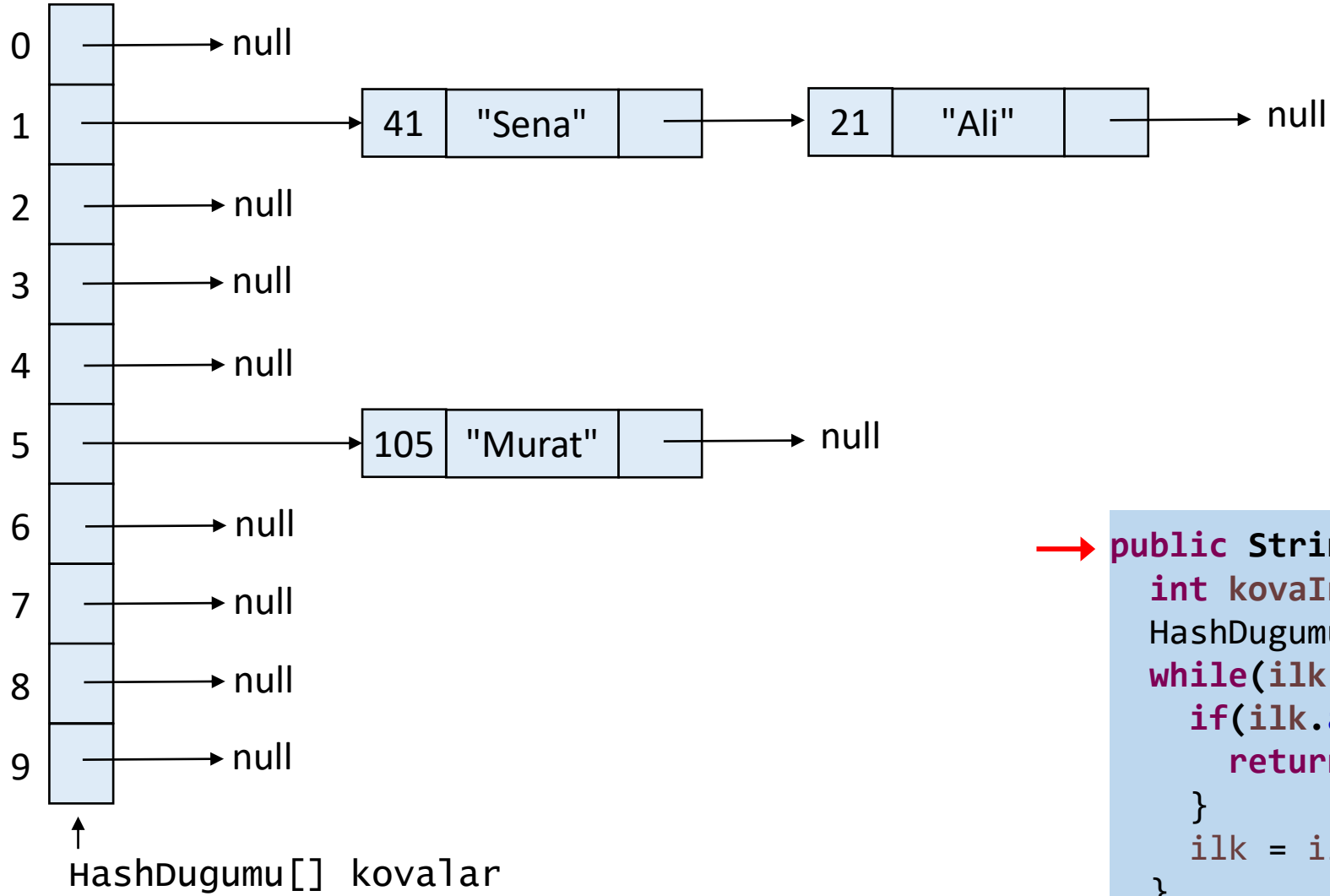


↑ HashDugumu[] kovalar

kovaSayisi = 10
buyukluk = 3

```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

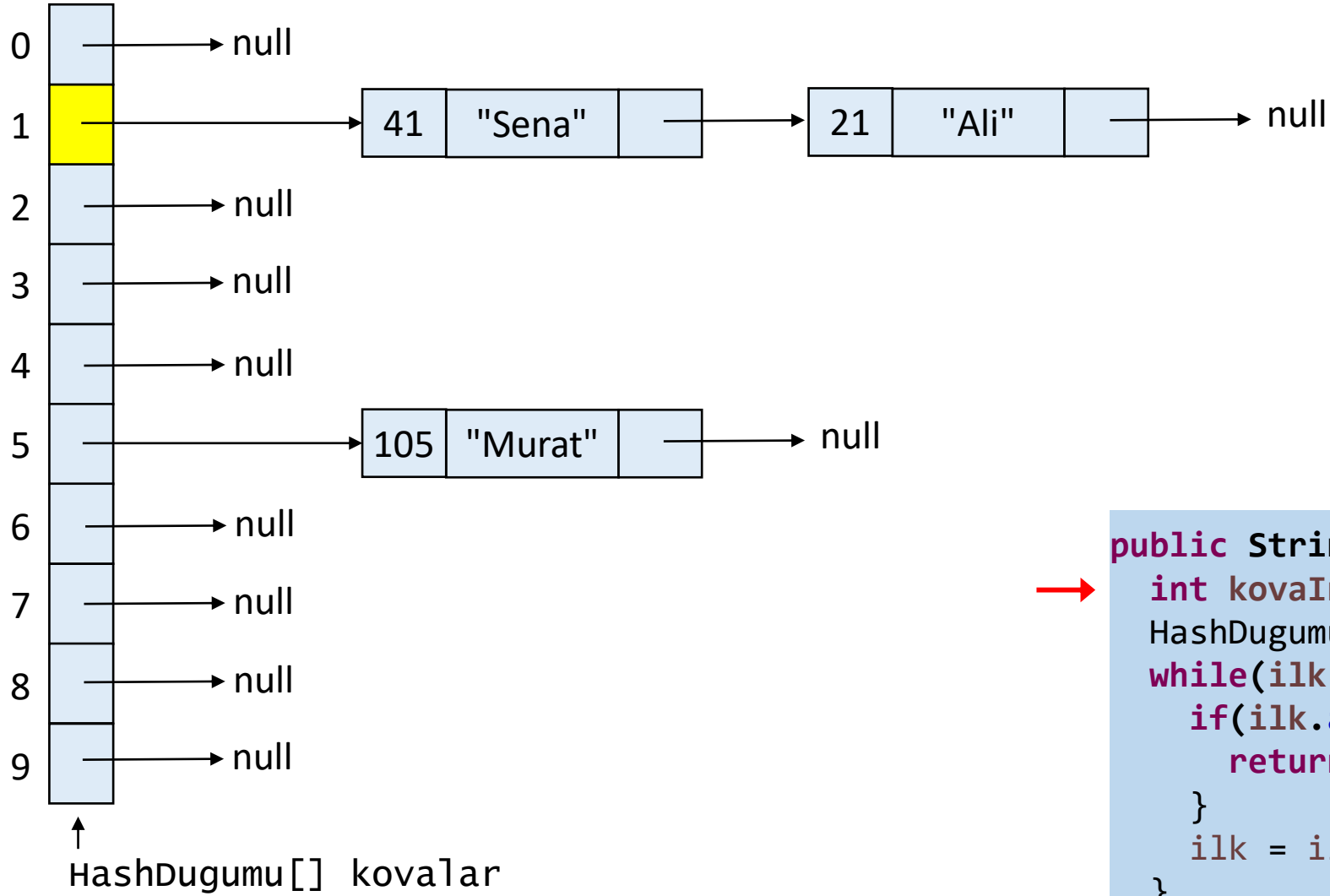
tablo.getir(21);



kovaSayisi = 10
buyukluk = 3
anahtar = 21

```
→ public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(21);

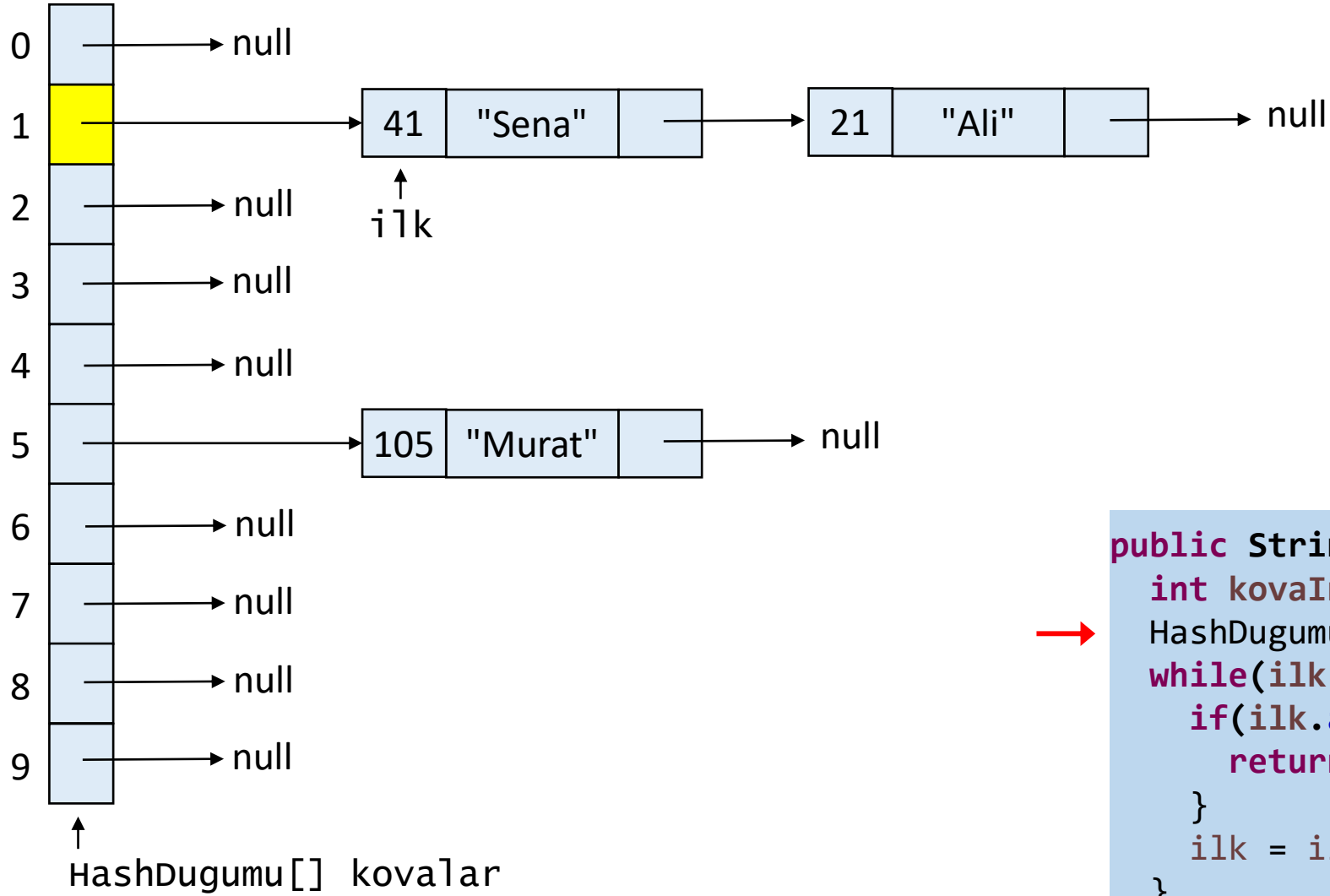


kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 kovaIndeksi = 1



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(21);

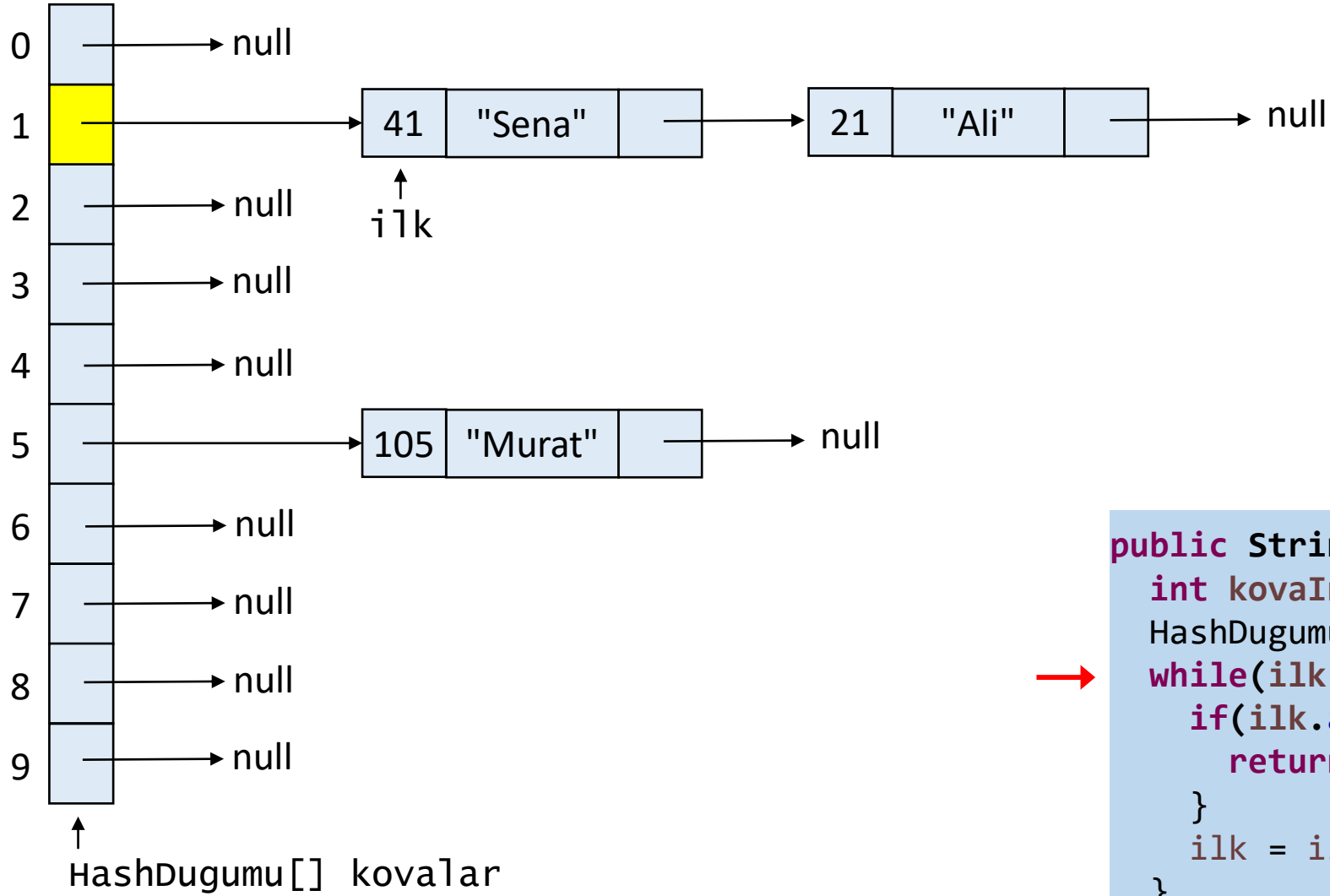


kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 kovaIndeksi = 1



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(21);

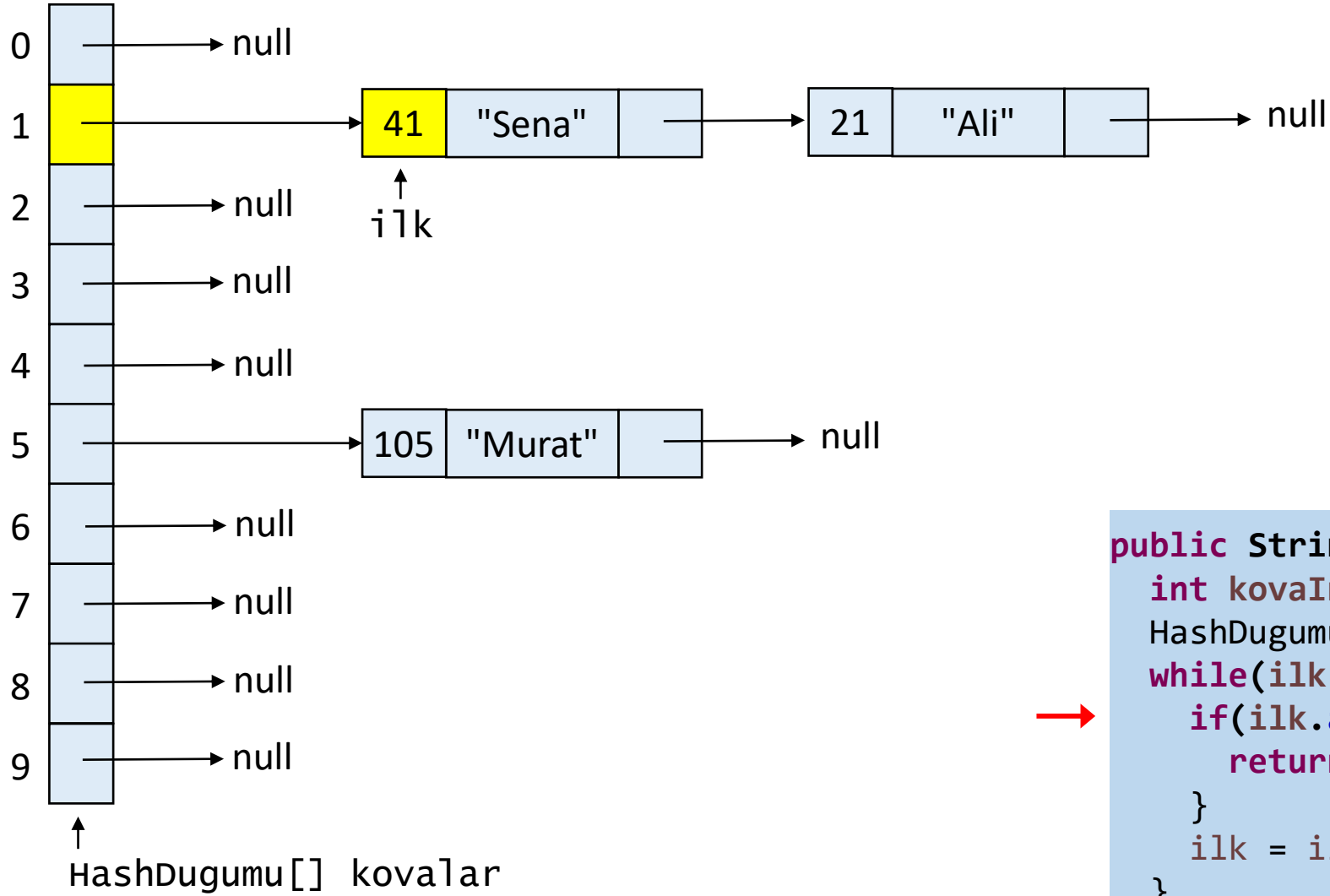


kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 kovaIndeksi = 1



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(21);

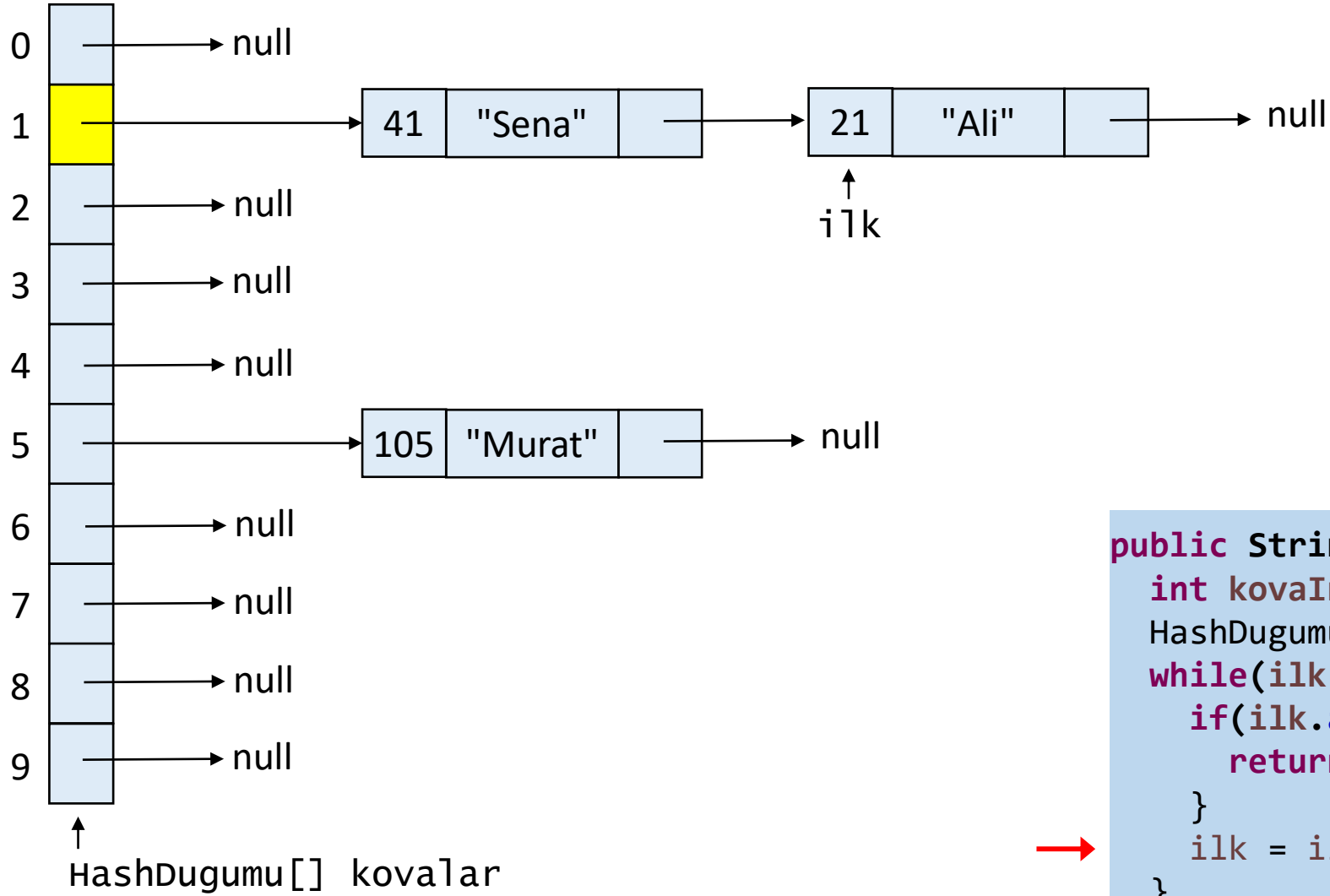


kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 kovaIndeksi = 1



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(21);

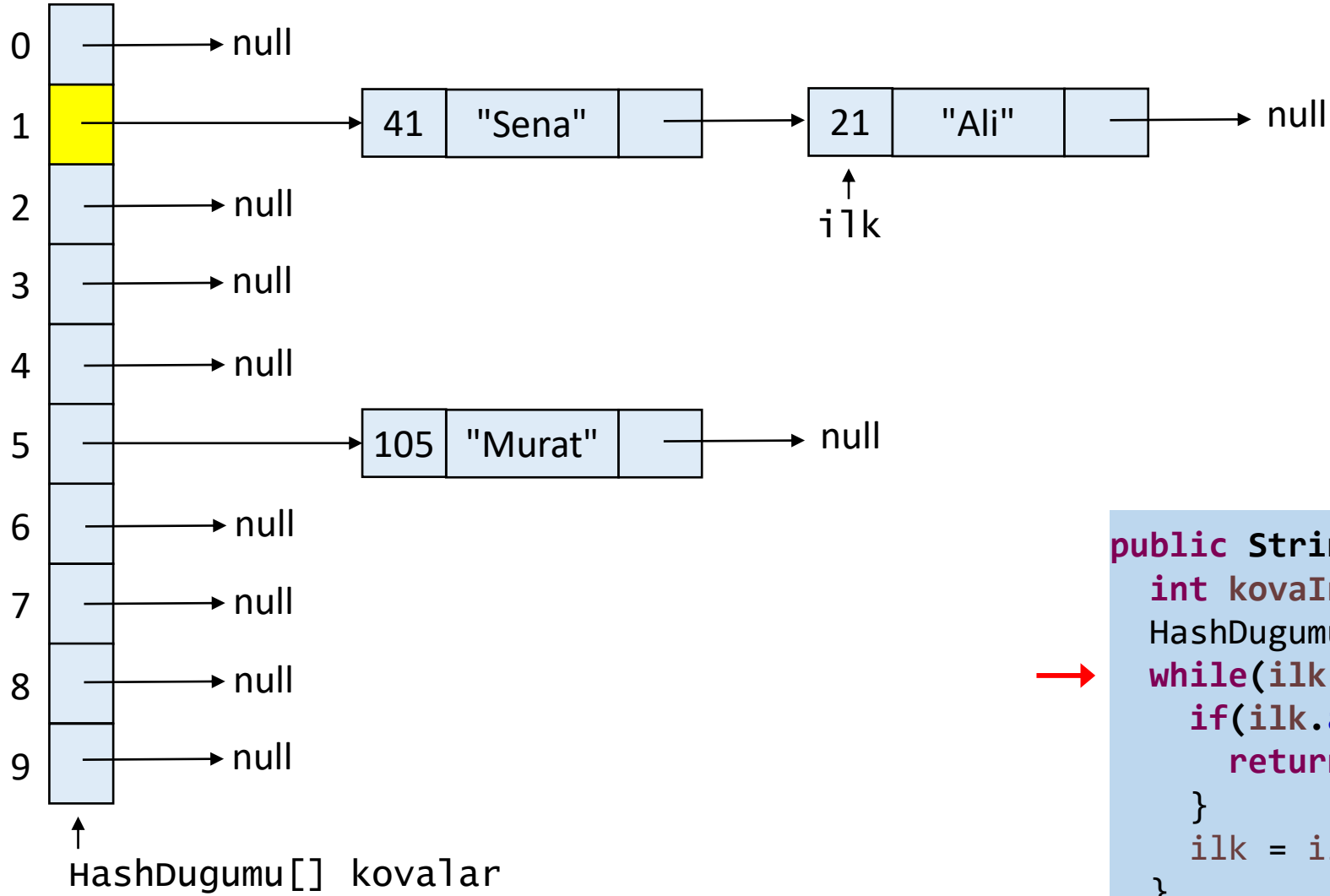


kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 kovaIndeksi = 1



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(21);

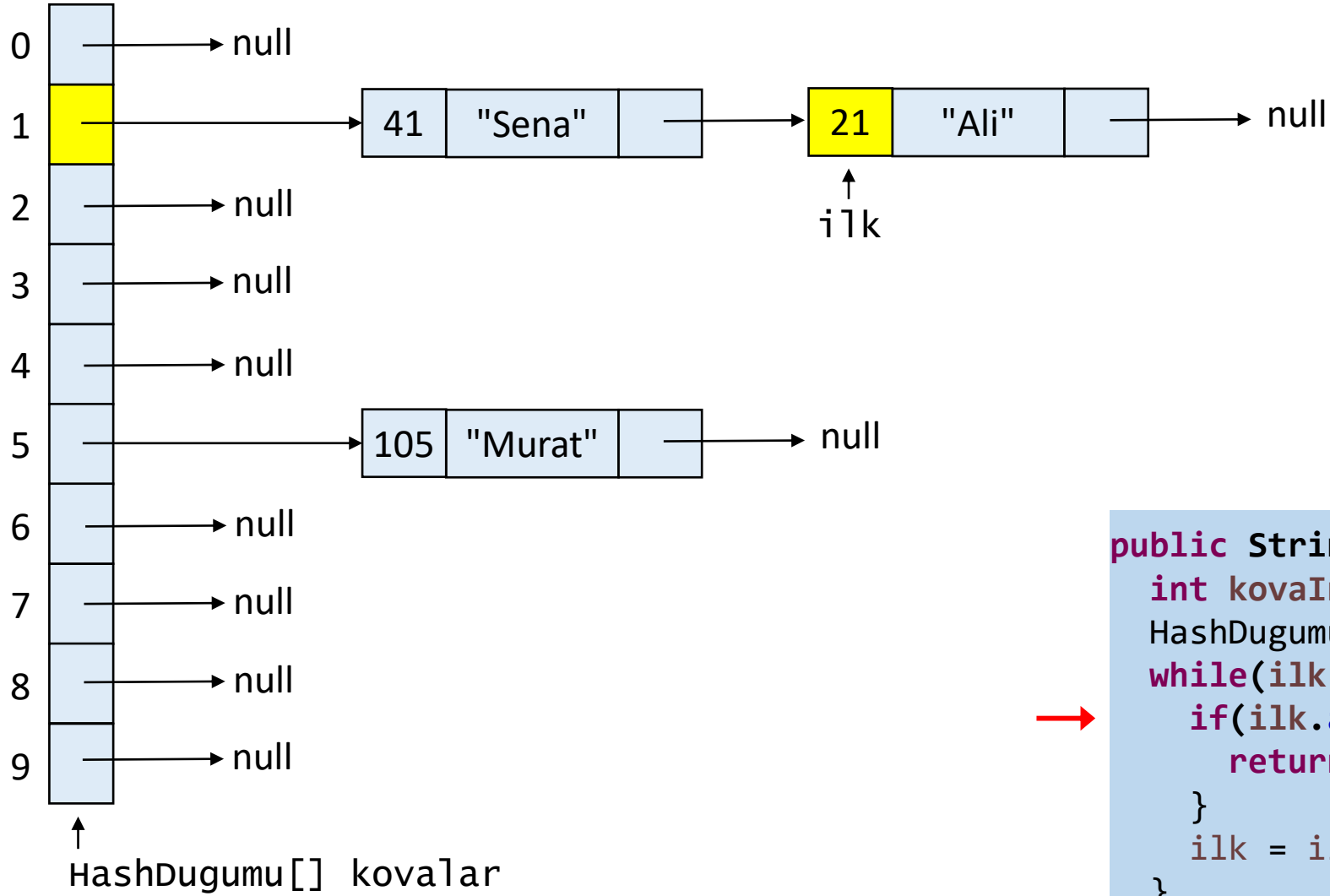


kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1



```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(21);

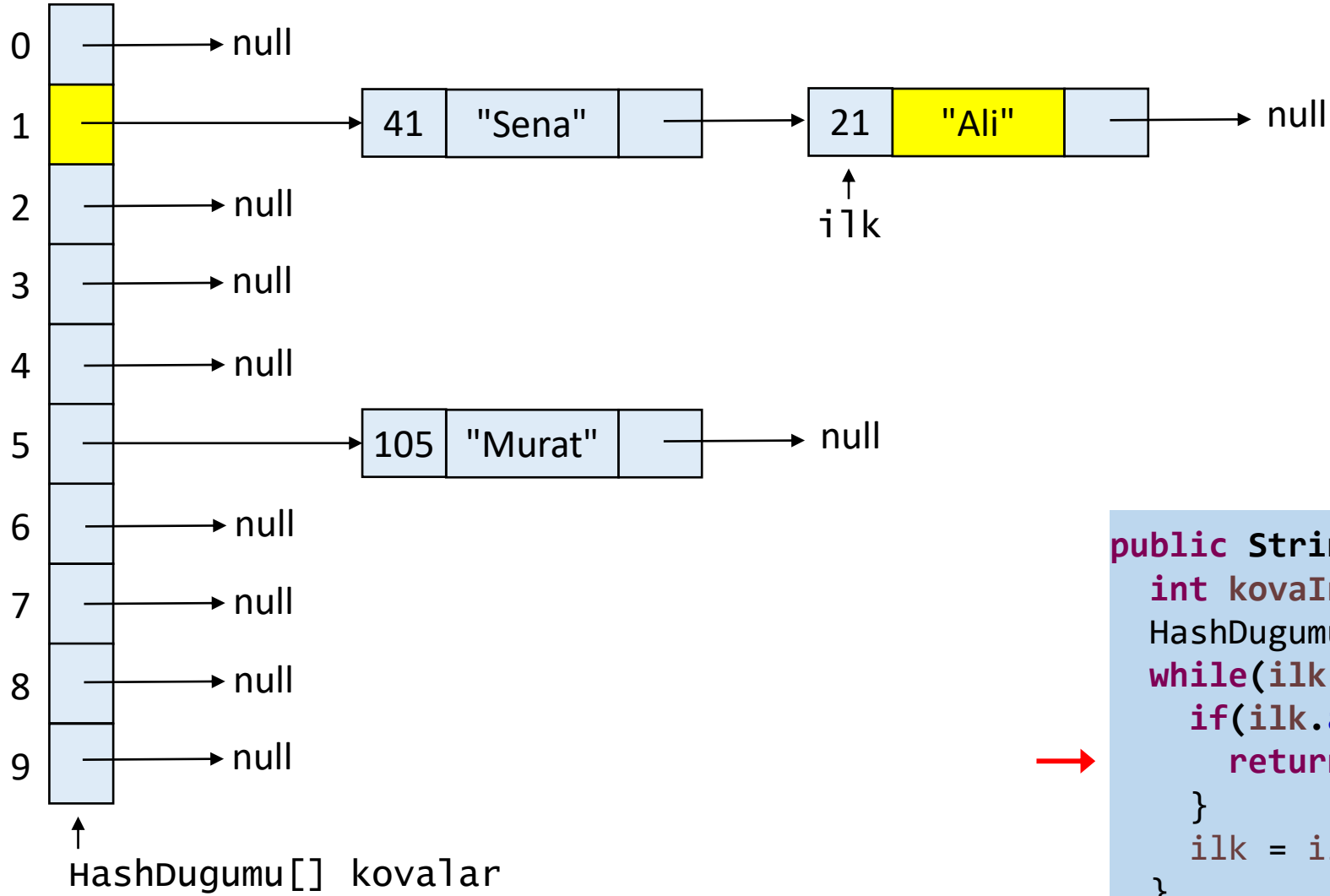


kovaSayisi = 10
 buyukluk = 3
 anahtar = 21
 kovaIndeksi = 1



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(21);

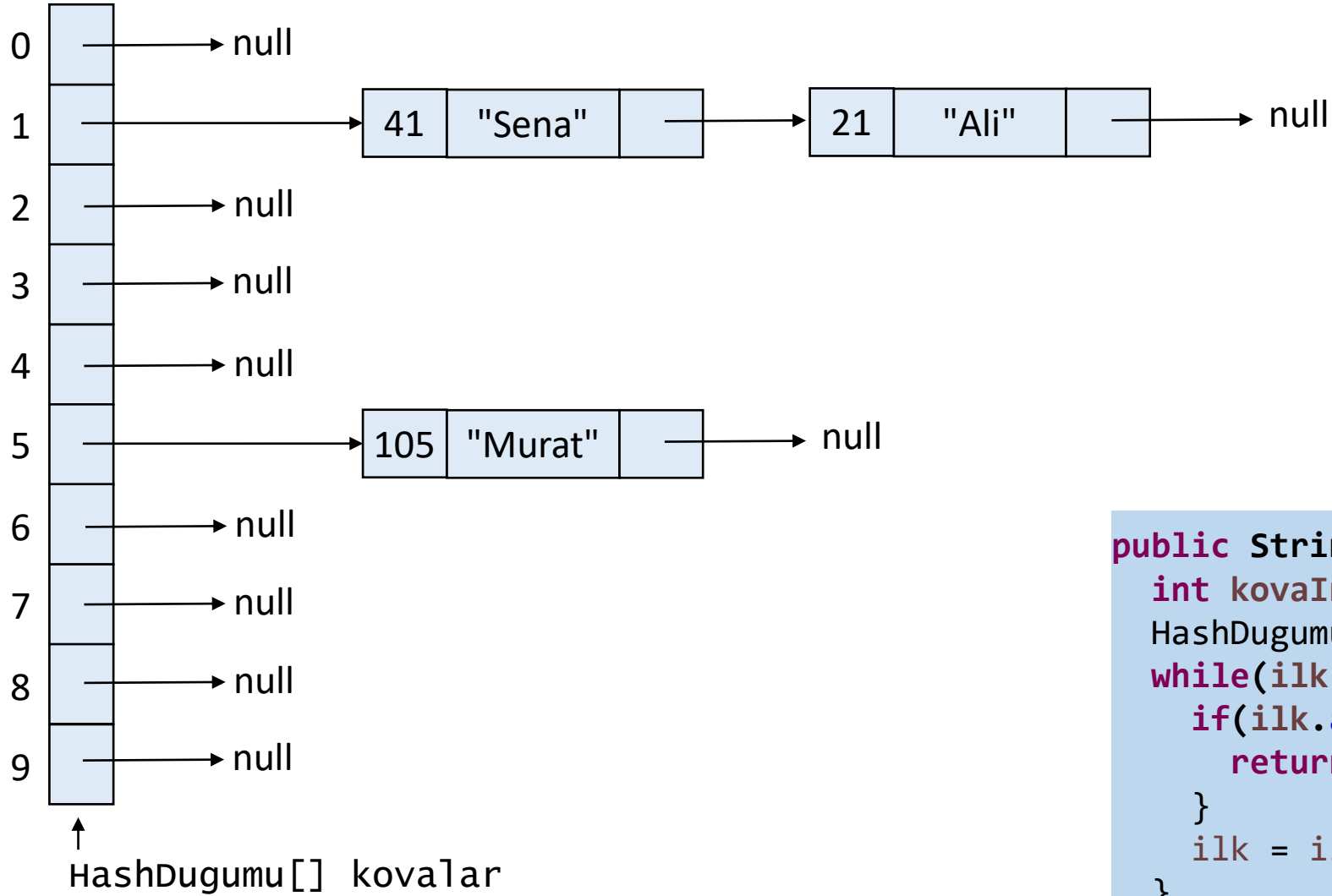


kovaSayisi = 10
buyukluk = 3
anahtar = 21
kovaIndeksi = 1



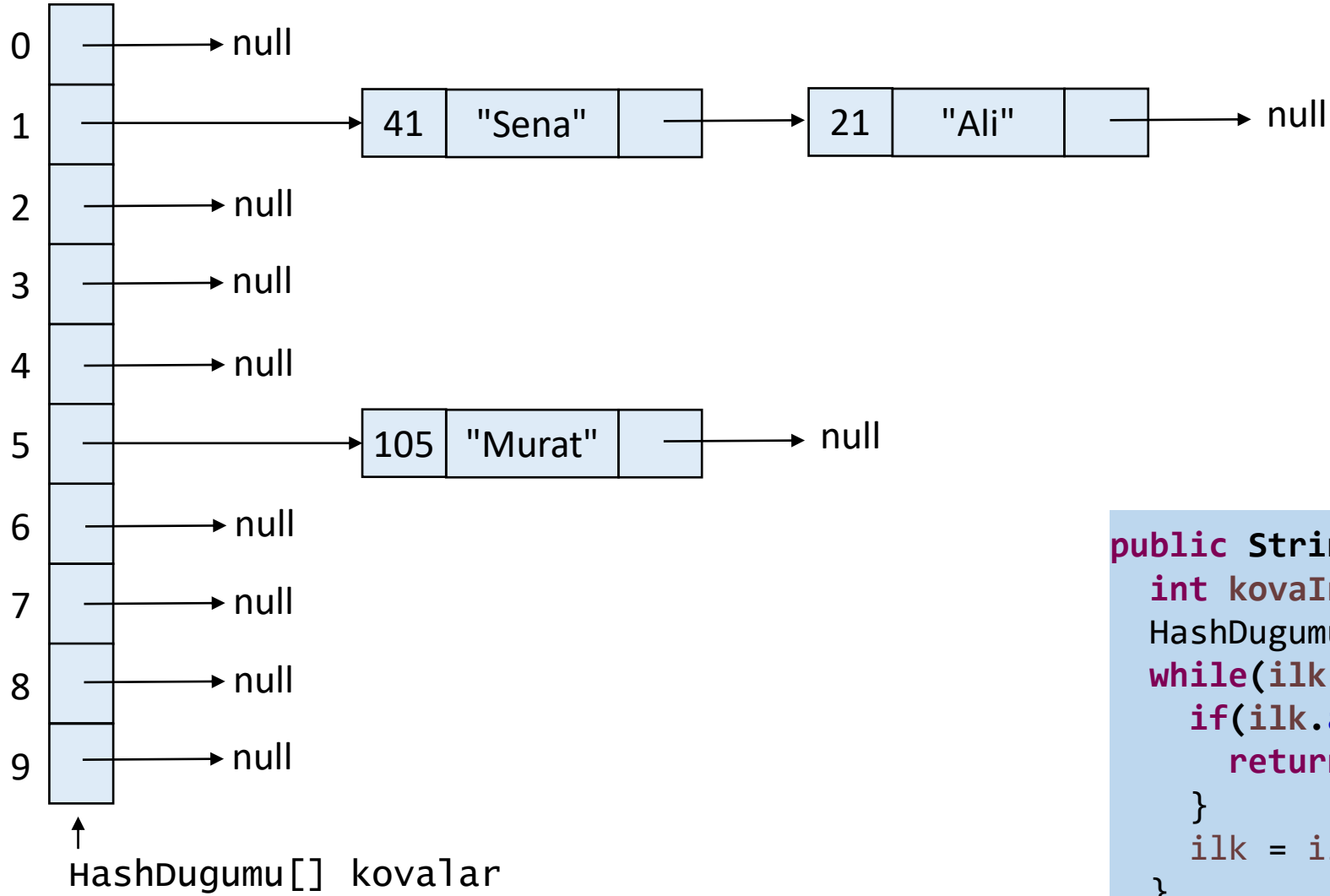
```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(21);



kovaSayisi = 10
buyukluk = 3

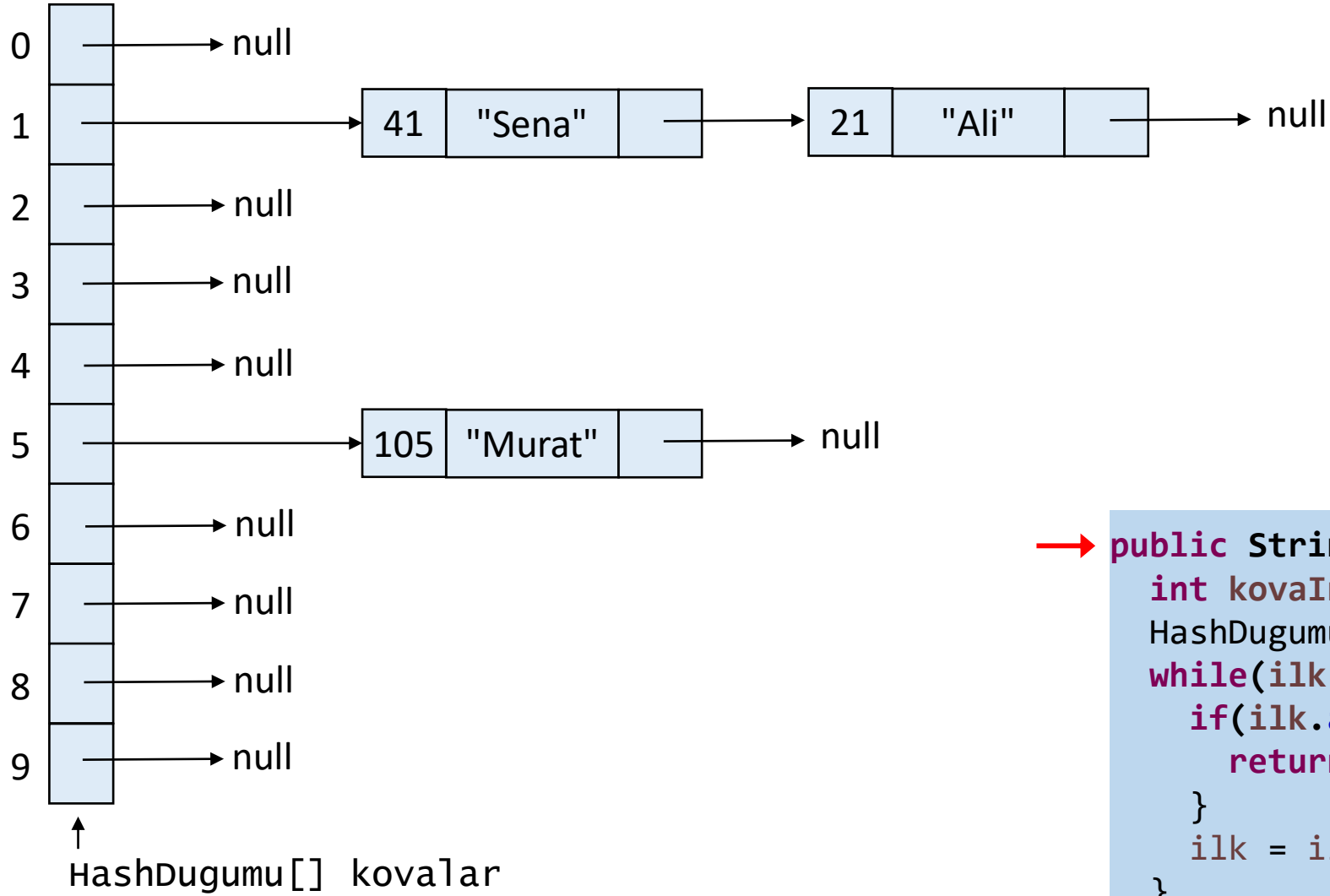
```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```



kovaSayisi = 10
buyukluk = 3

```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(88);



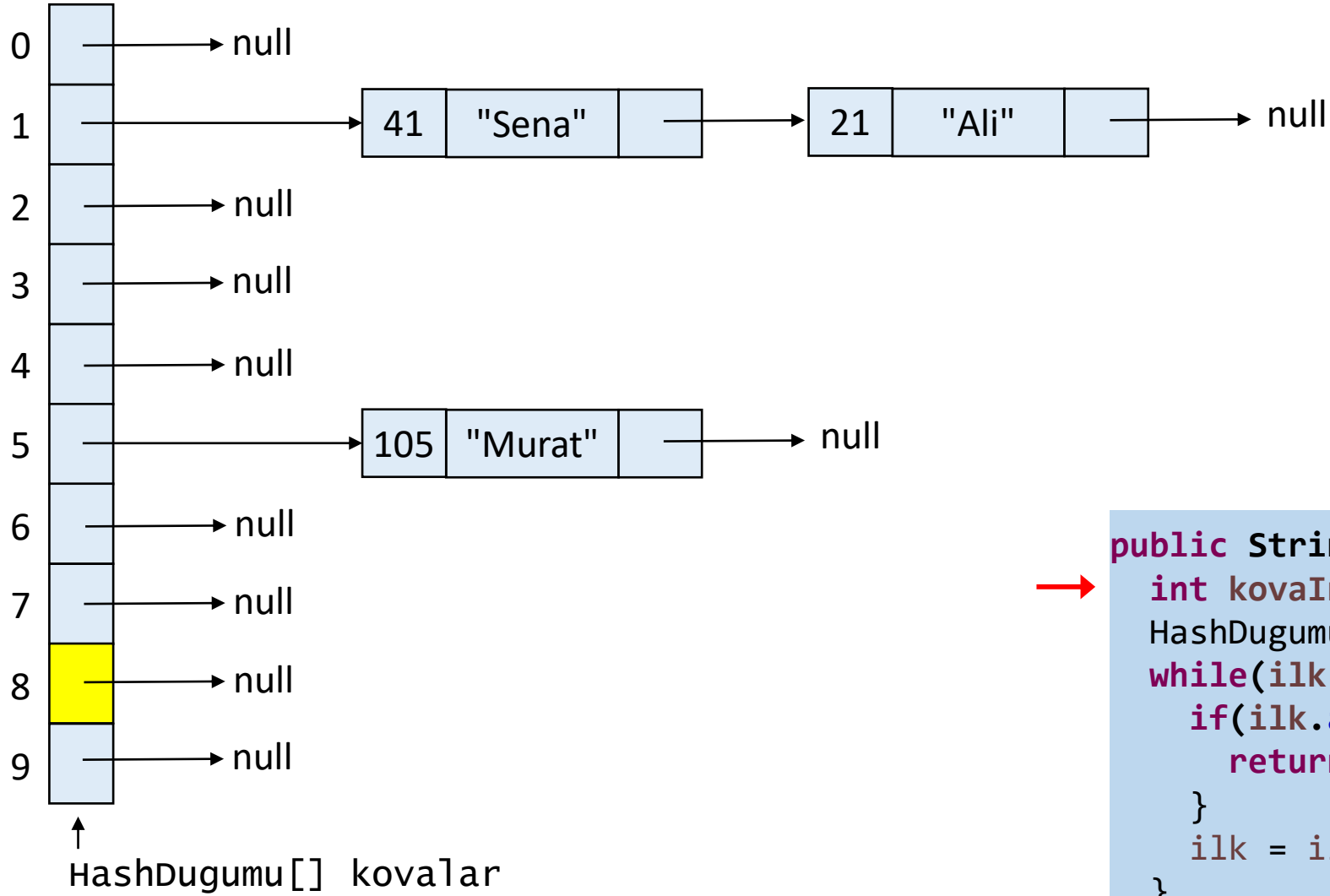
kovaSayisi = 10
 buyukluk = 3
 anahtar = 88

```

→ public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}

```

tablo.getir(88);

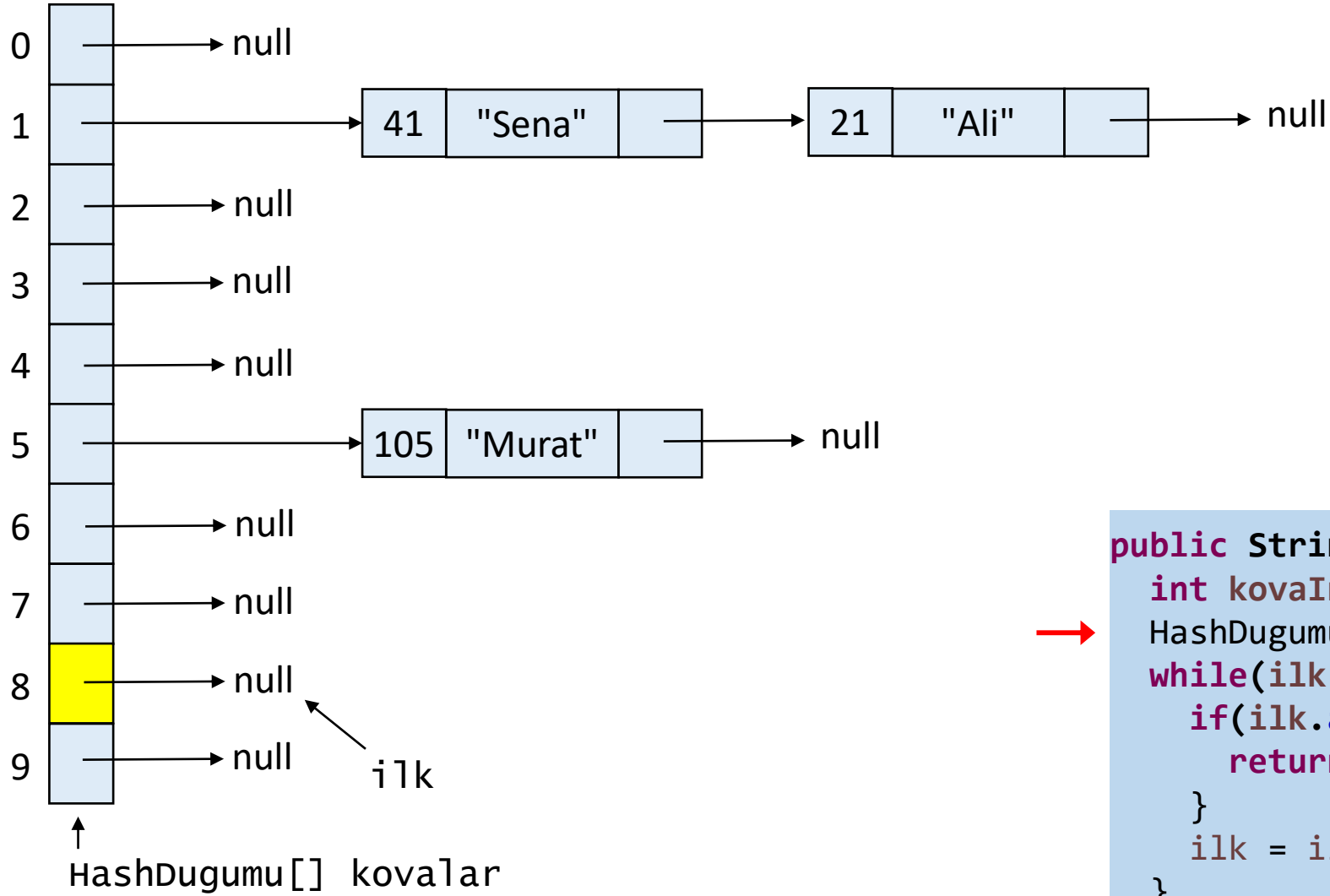


kovaSayisi = 10
buyukluk = 3
anahtar = 88
kovaIndeksi = 8



```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```

tablo.getir(88);

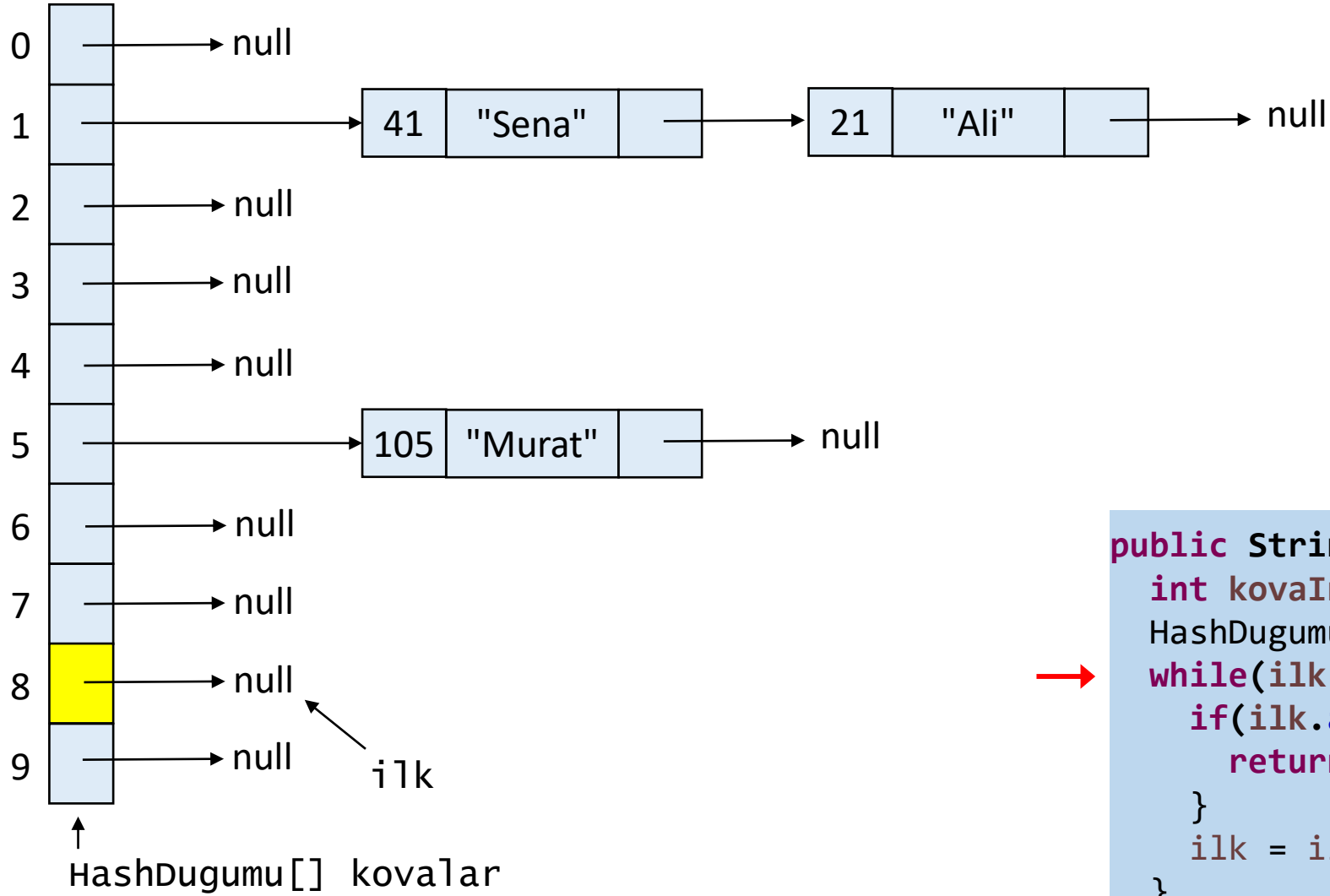


kovaSayisi = 10
 buyukluk = 3
 anahtar = 88
 kovaIndeksi = 8



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(88);

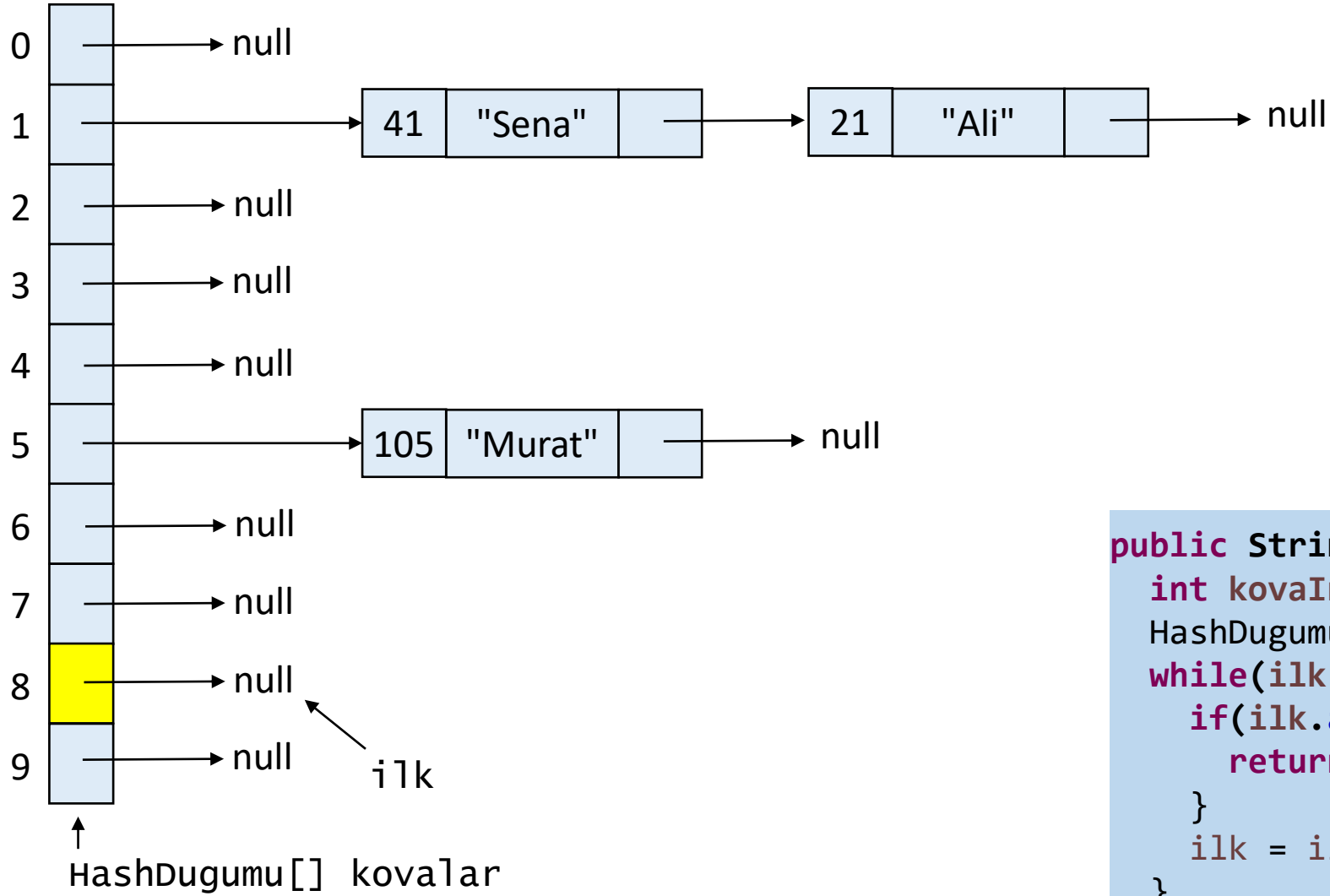


kovaSayisi = 10
 buyukluk = 3
 anahtar = 88
 kovaIndeksi = 8



```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```

tablo.getir(88);

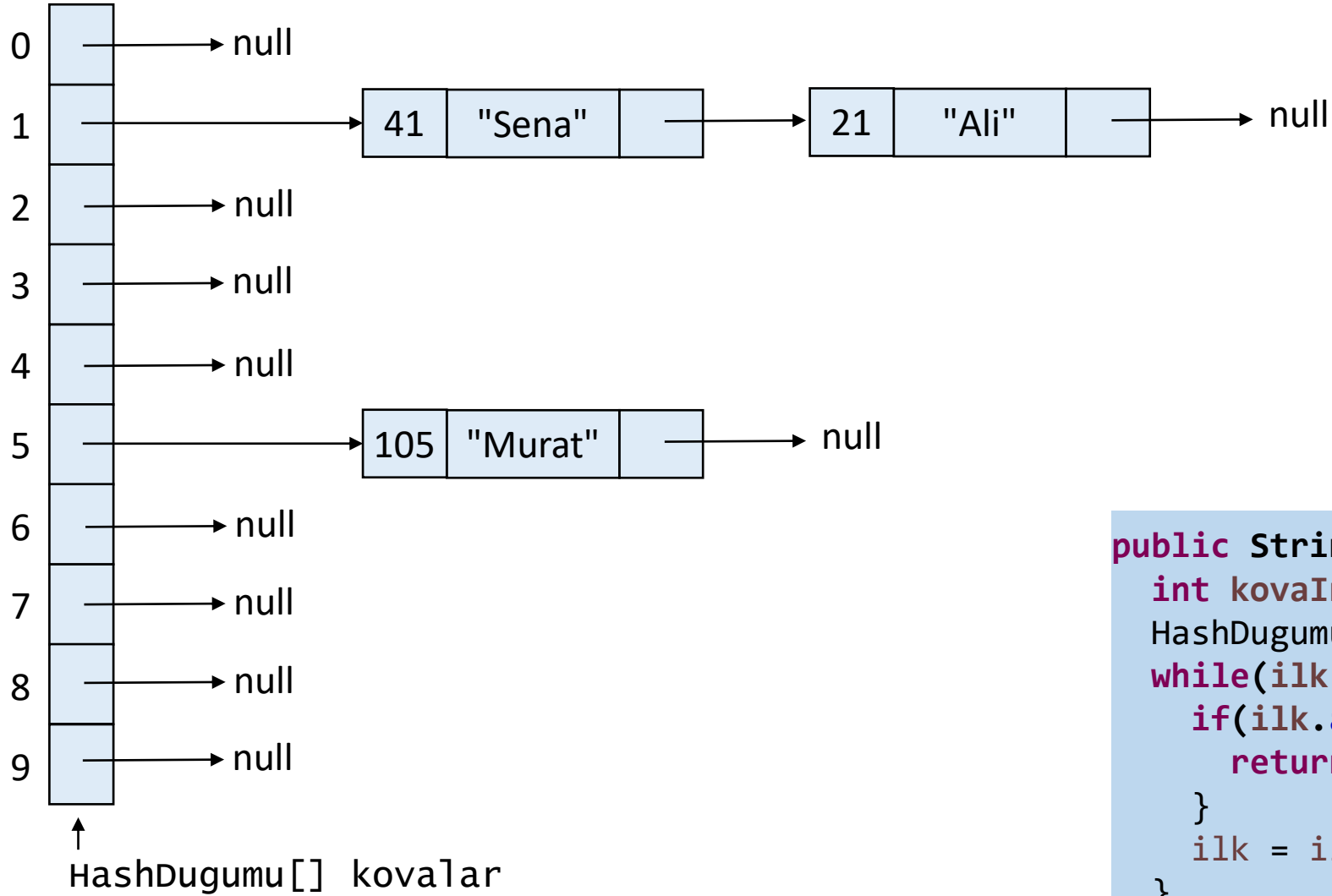


kovaSayisi = 10
 buyukluk = 3
 anahtar = 88
 kovaIndeksi = 8

```
public String getir(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            return ilk.deger;
        }
        ilk = ilk.sonraki;
    }
    return null;
}
```



tablo.getir(88);

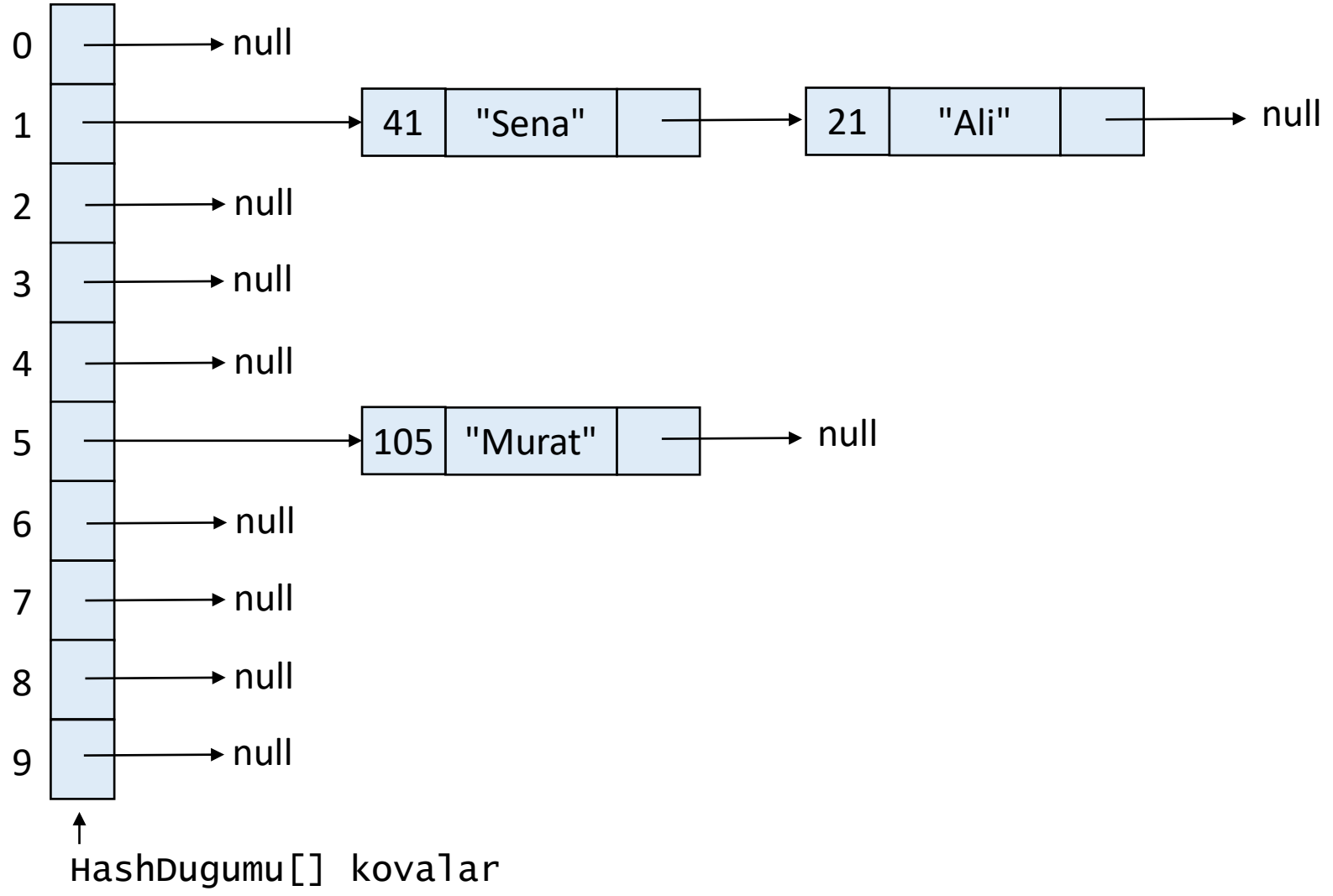


kovaSayisi = 10
buyukluk = 3

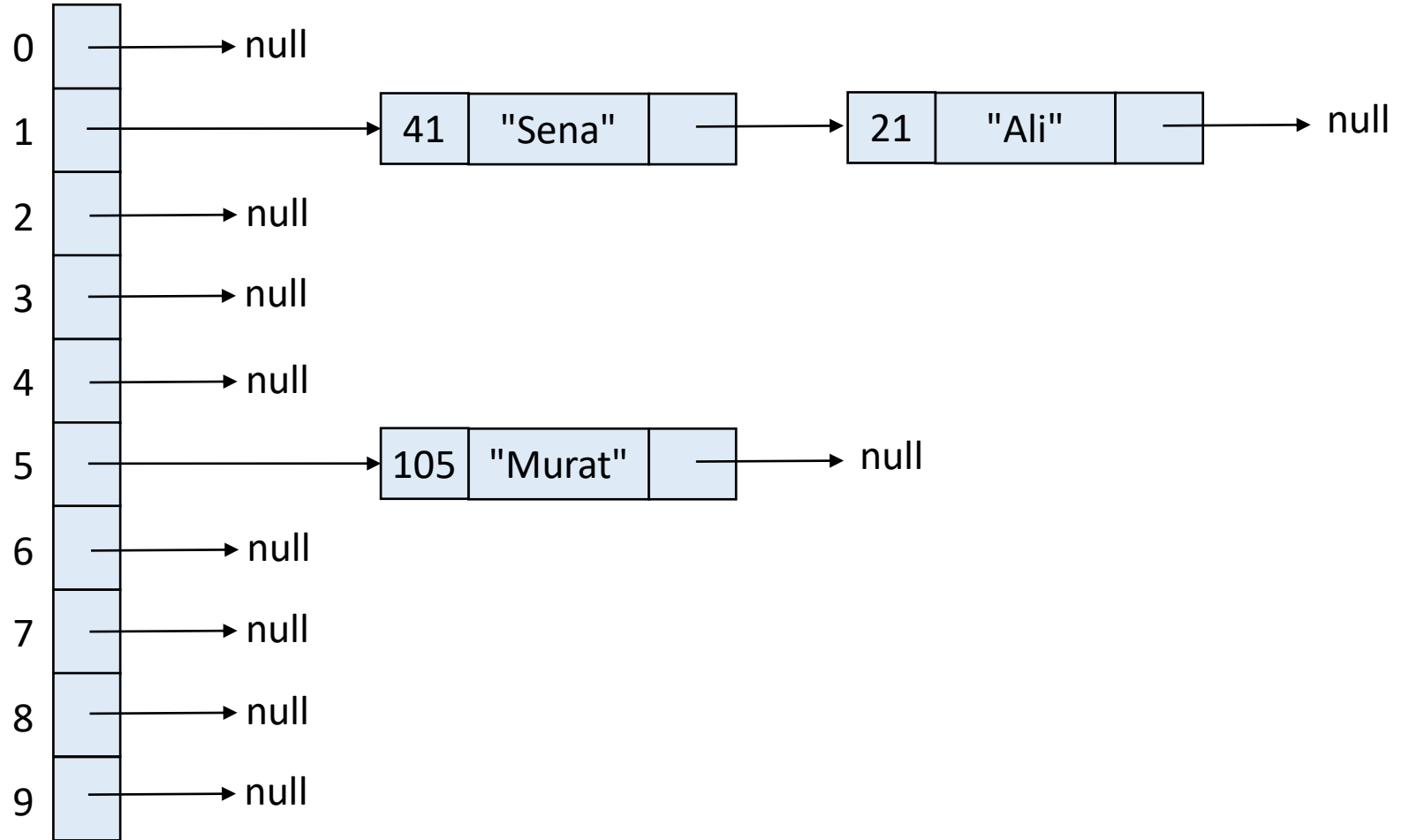
```
public String getir(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            return ilk.deger;  
        }  
        ilk = ilk.sonraki;  
    }  
    return null;  
}
```


Hash Tablosundan Anahtar Silme





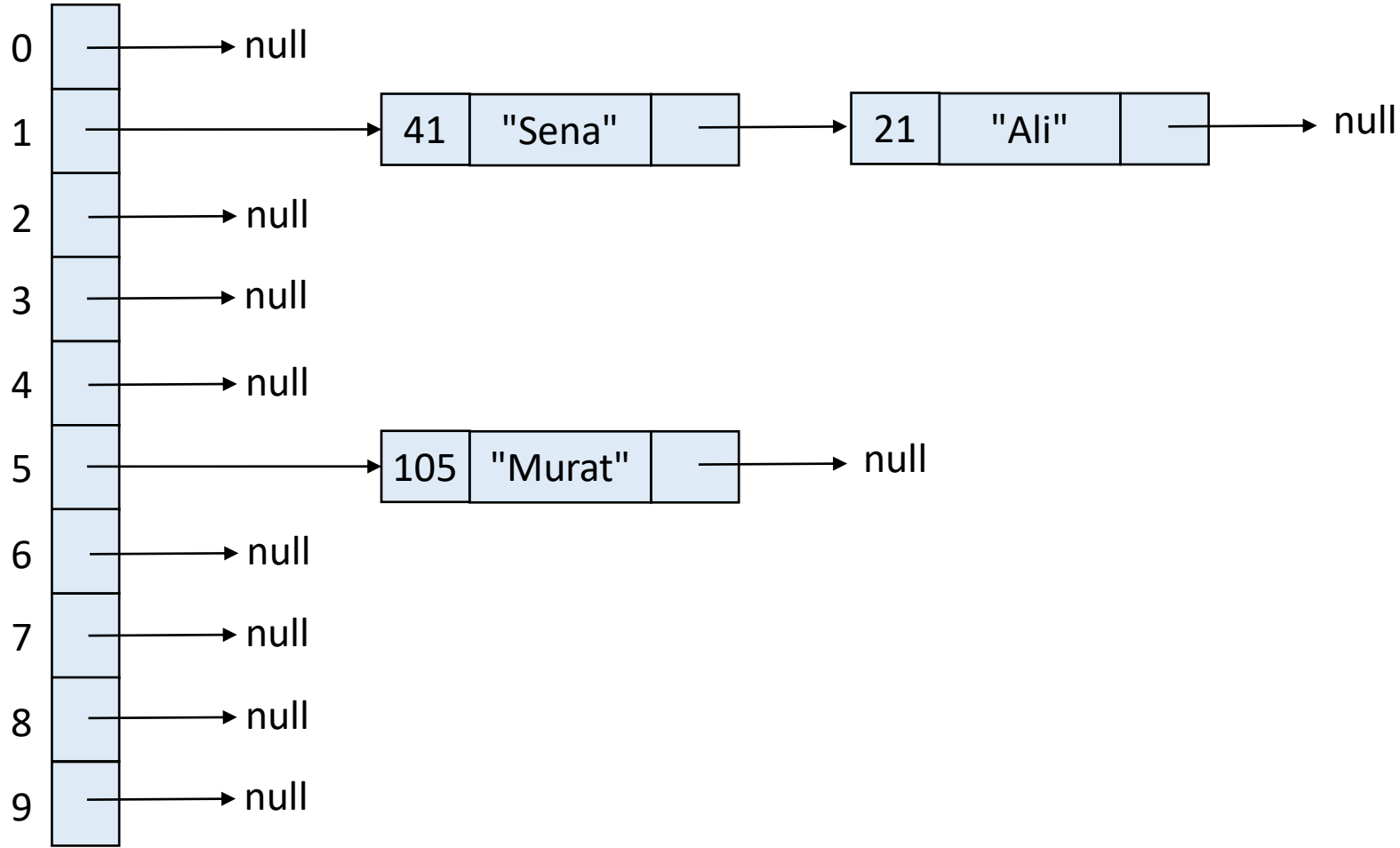
kovaSayisi = 10
buyukluk = 3



kovaSayisi = 10
buyukluk = 3

↑
HashDugumu[] kovalar

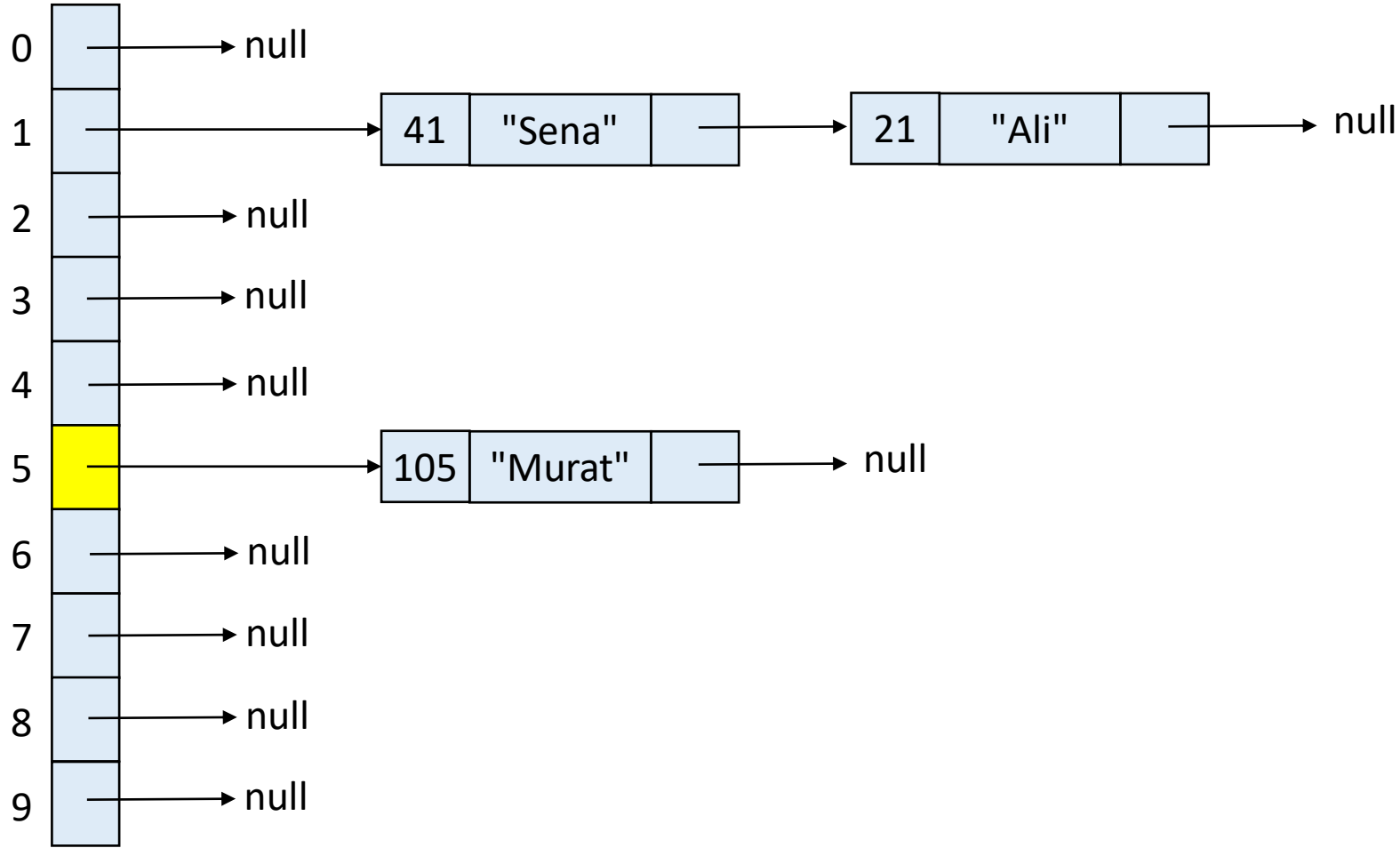
tablo.sil(105);



kovaSayisi = 10
buyukluk = 3
anahtar = 105

↑
HashDugumu[] kovalar

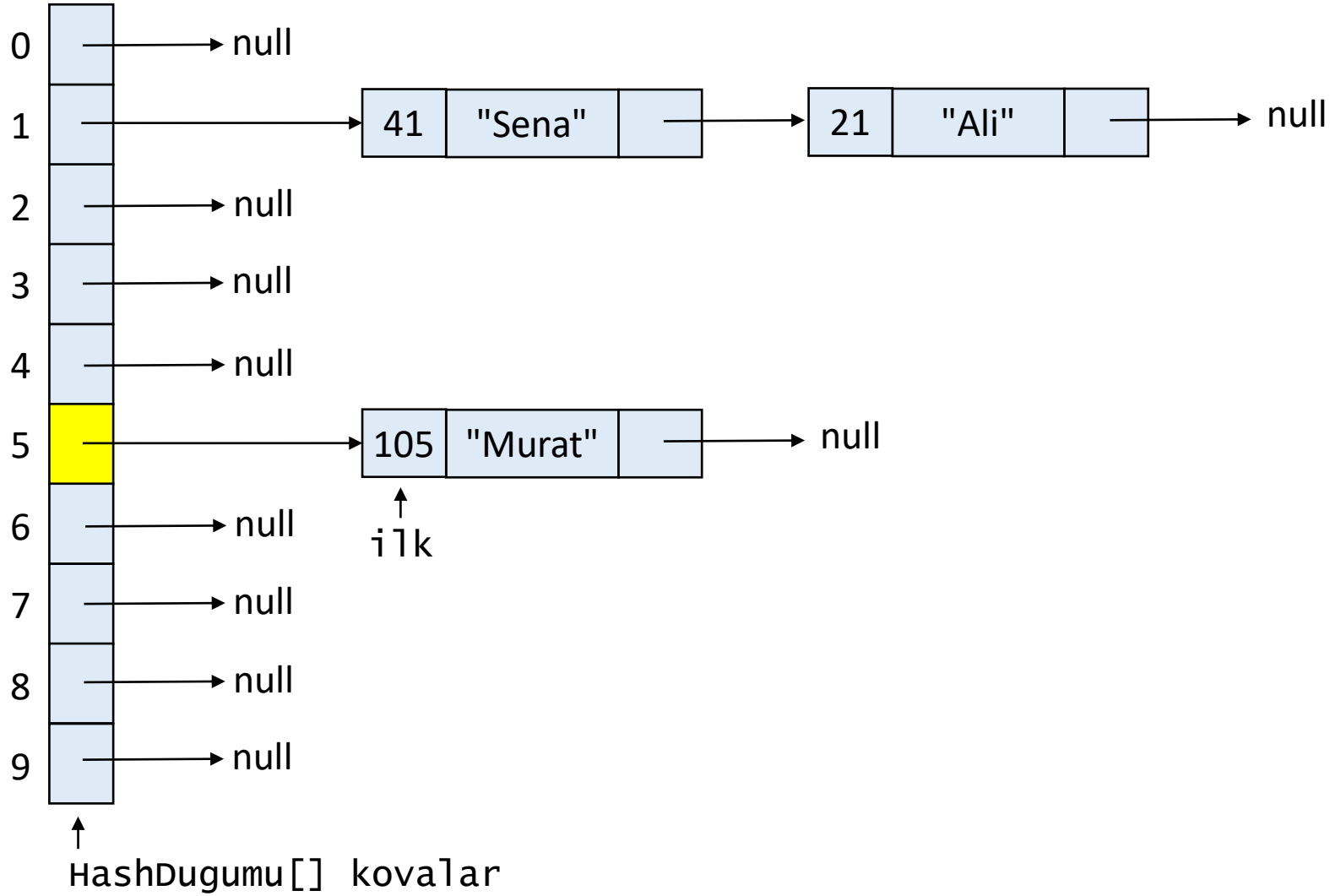
tablo.sil(105);



kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

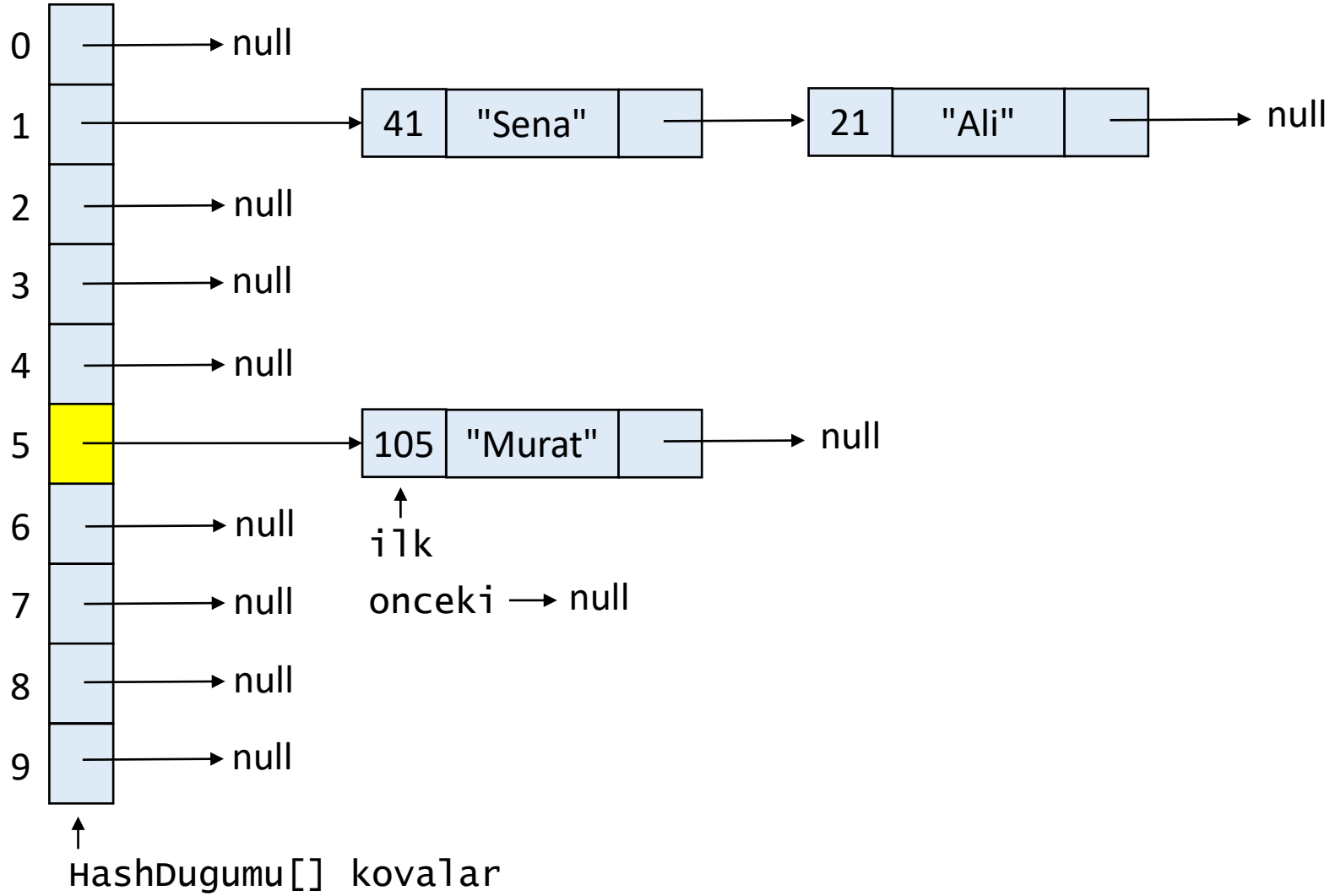
↑
HashDugumu[] kovalar

tablo.sil(105);



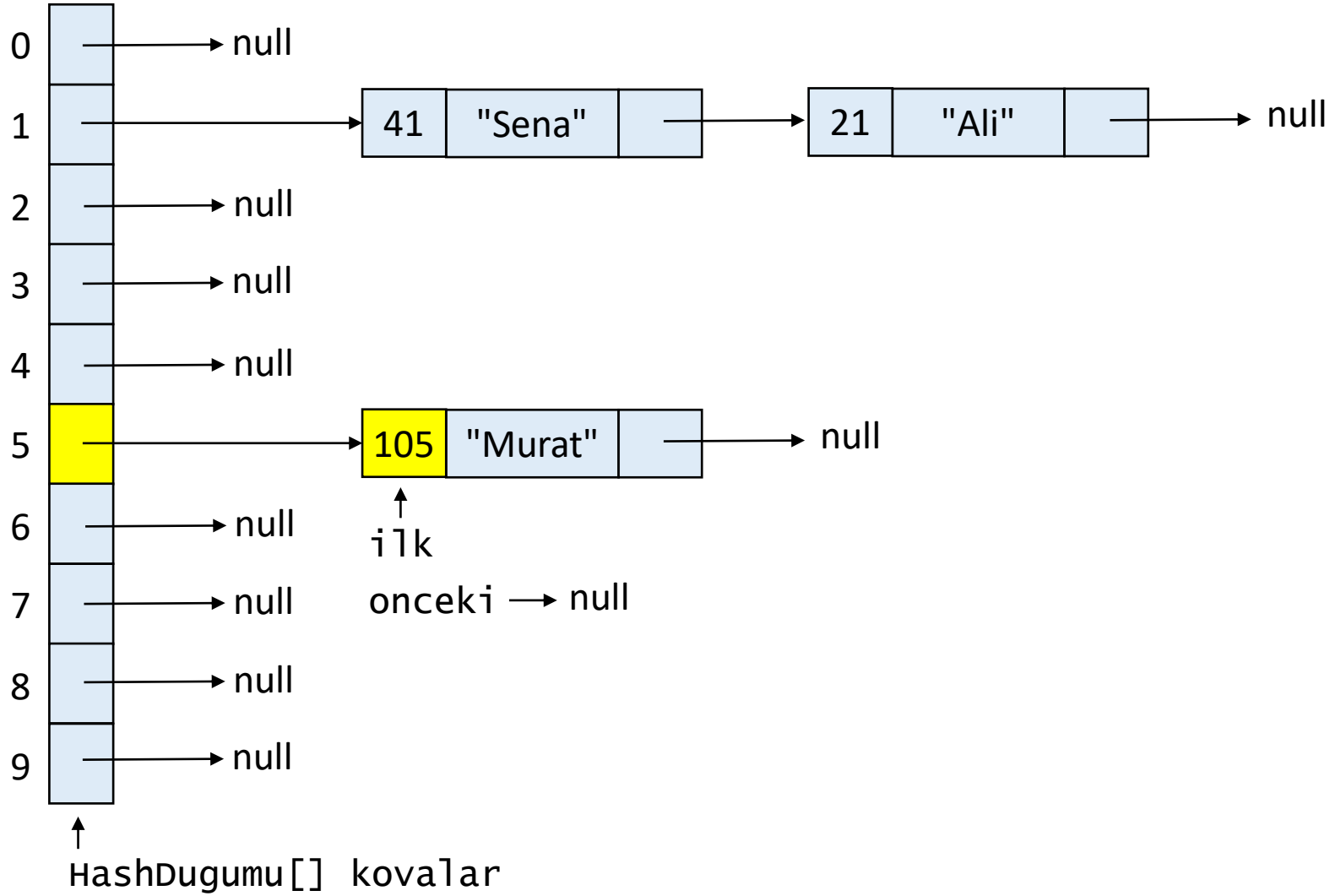
kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

```
tablo.sil(105);
```



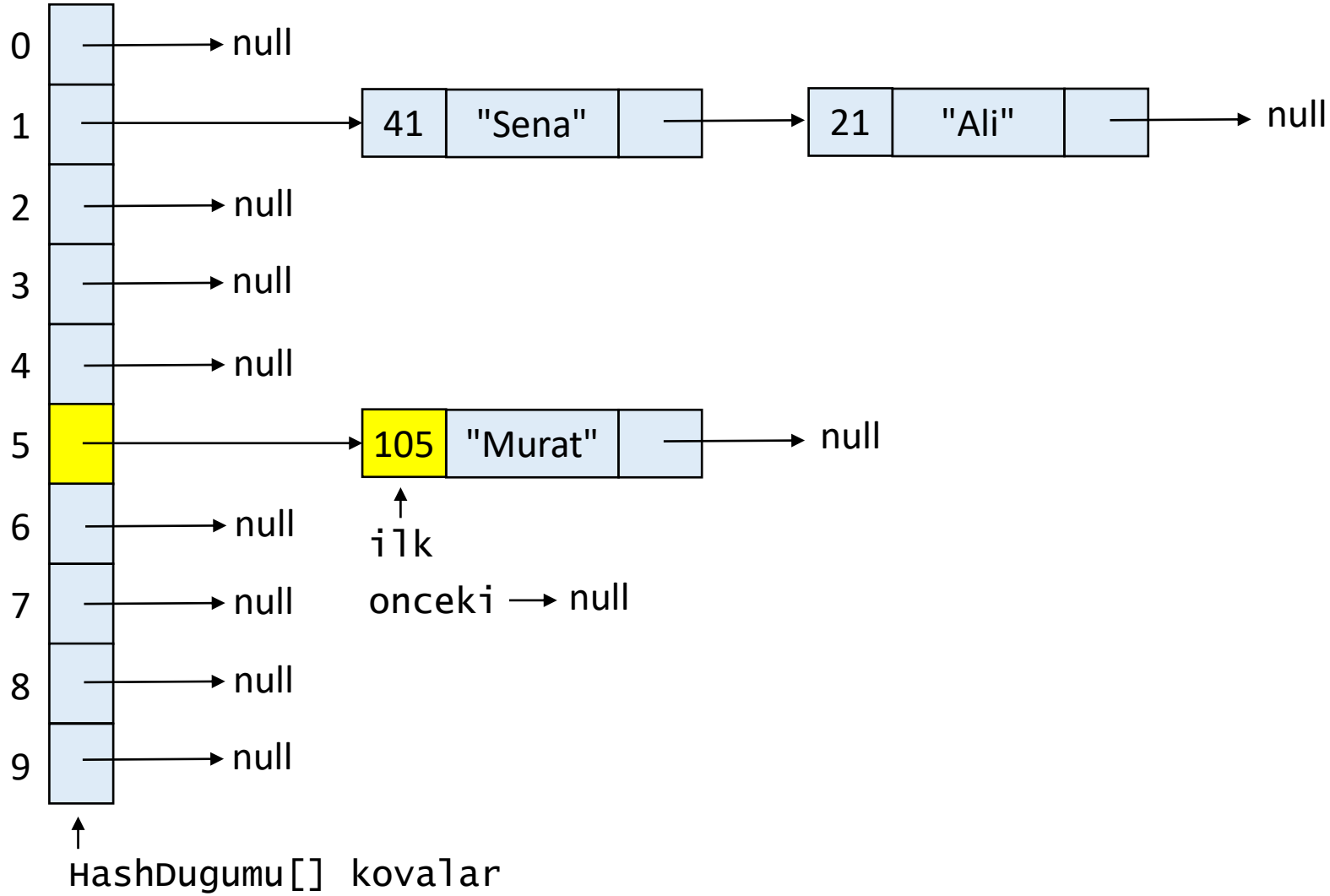
kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

```
tablo.sil(105);
```



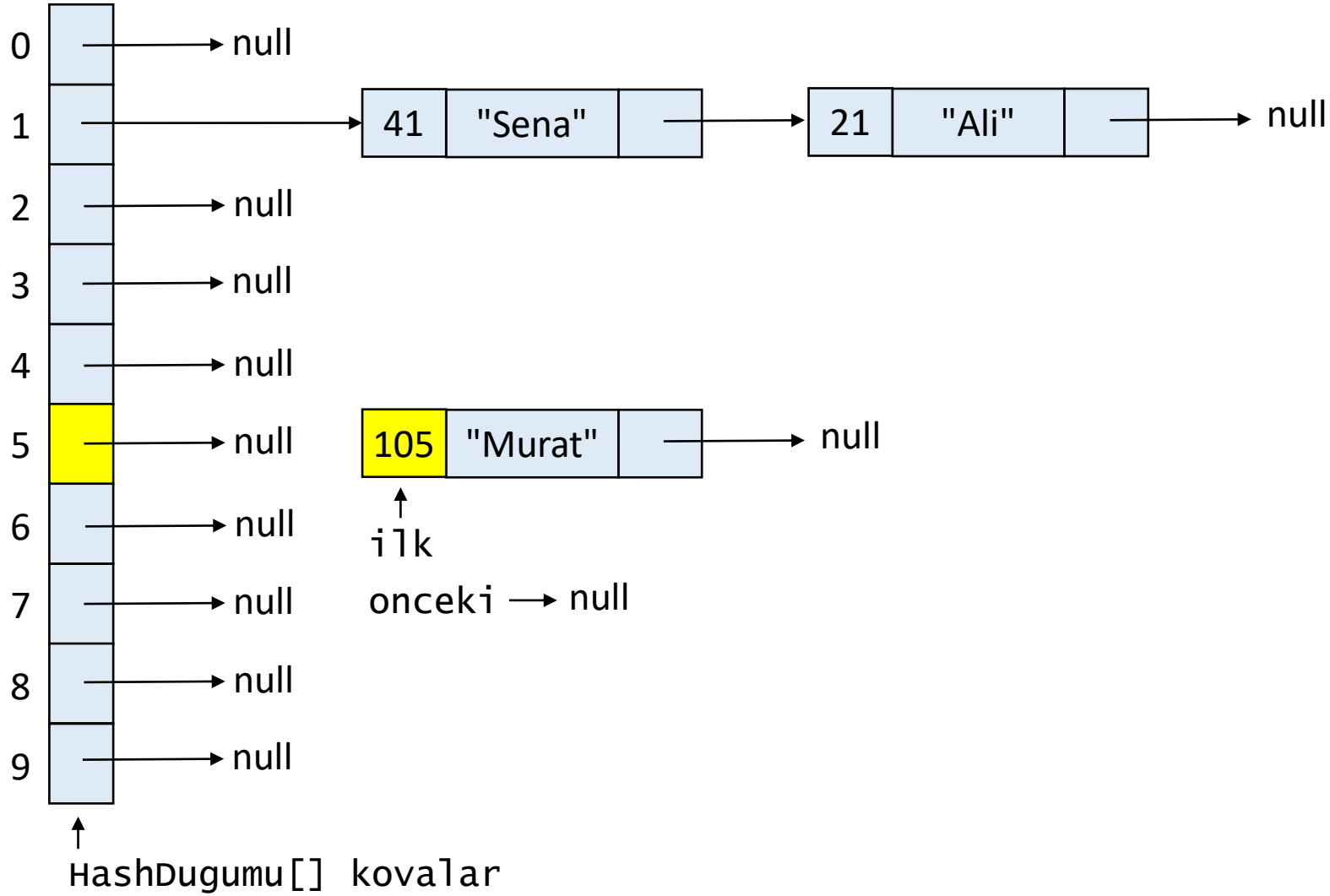
kovaSayisi = 10
buyukluk = 3
anahtar = 105
kovaIndeksi = 5

tablo.sil(105);



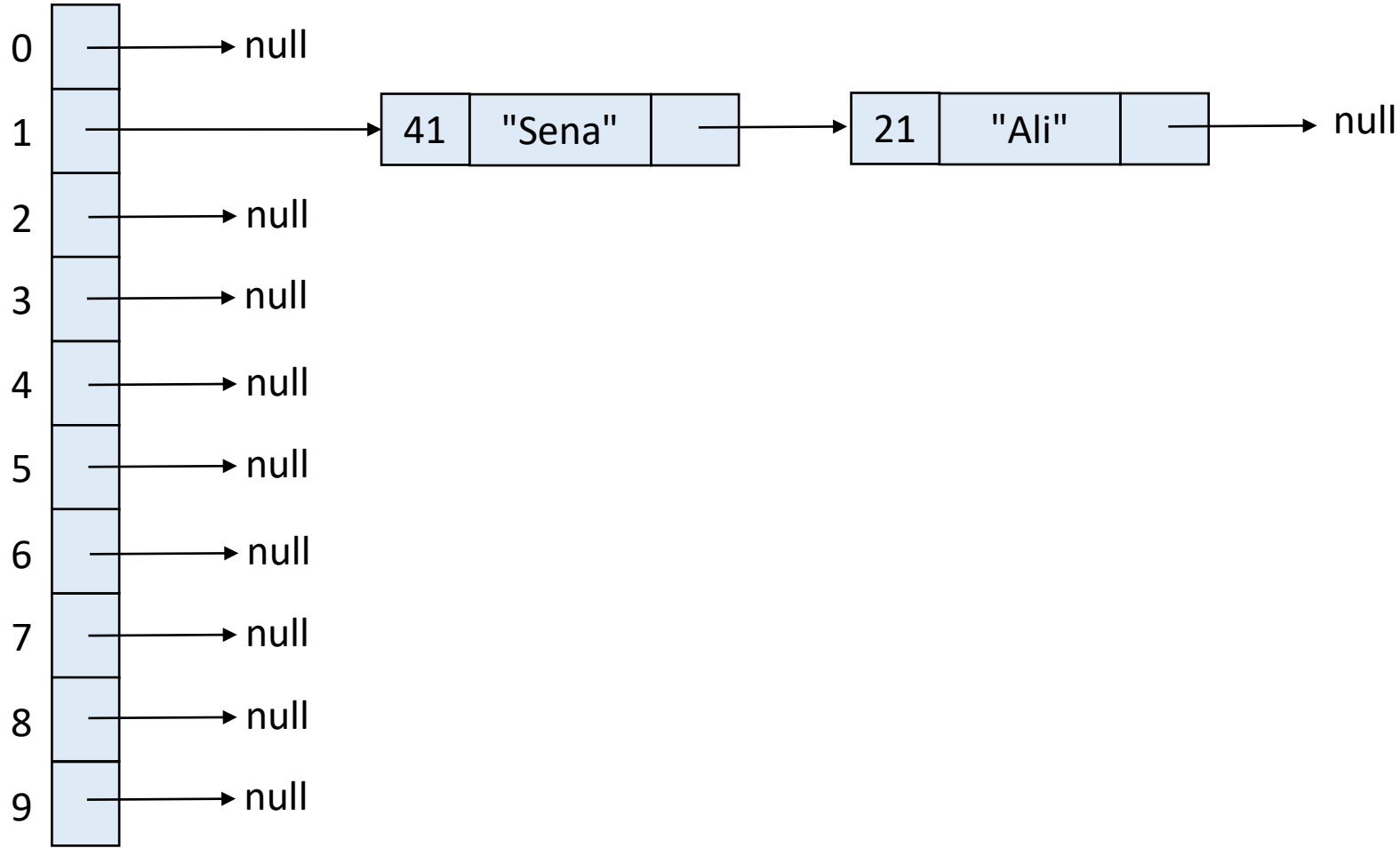
kovaSayisi = 10
buyukluk = 2
anahtar = 105
kovaIndeksi = 5

```
tablo.sil(105);
```



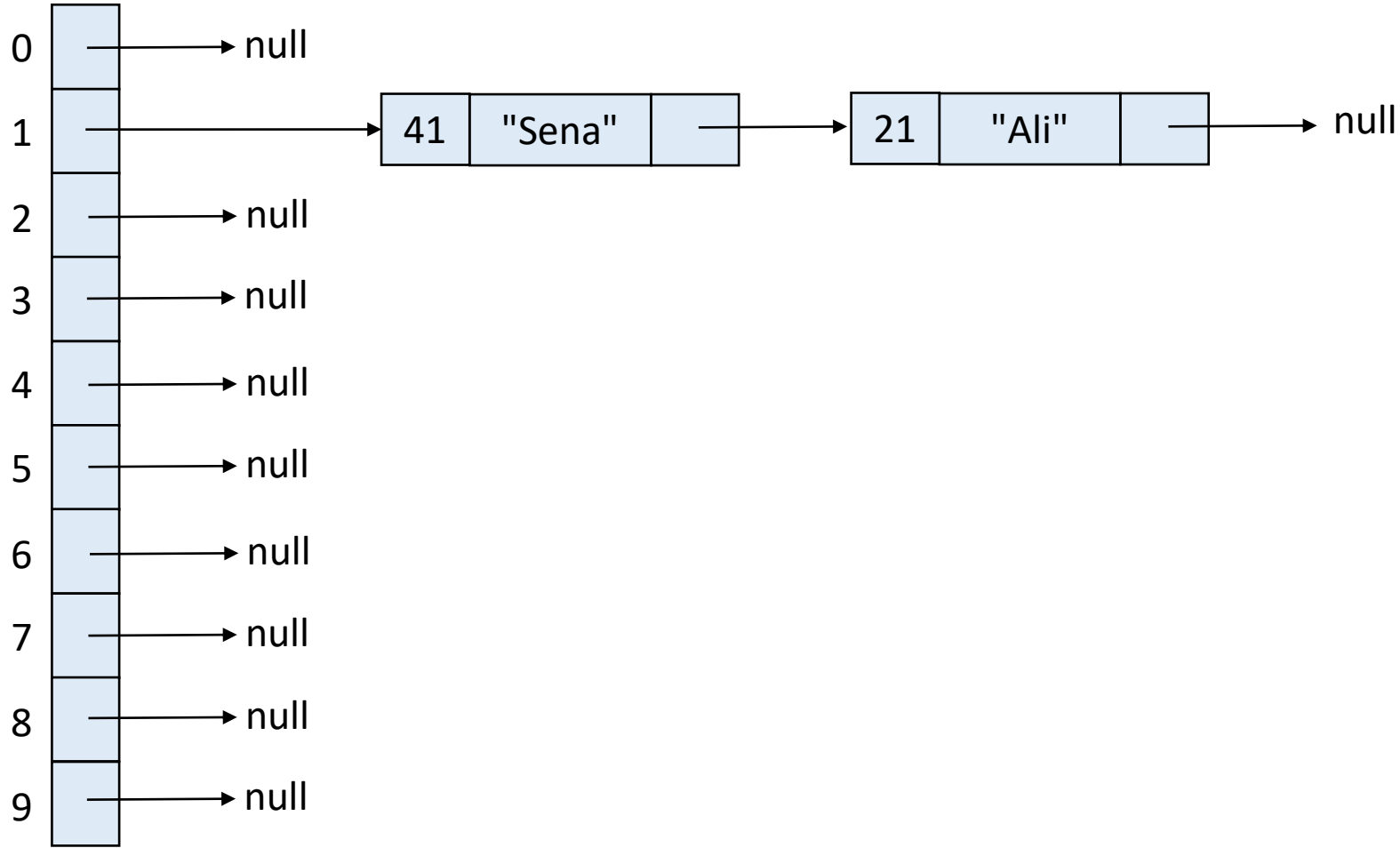
kovaSayisi = 10
buyukluk = 2
anahtar = 105
kovaIndeksi = 5

```
tablo.sil(105);
```



kovaSayisi = 10
buyukluk = 2

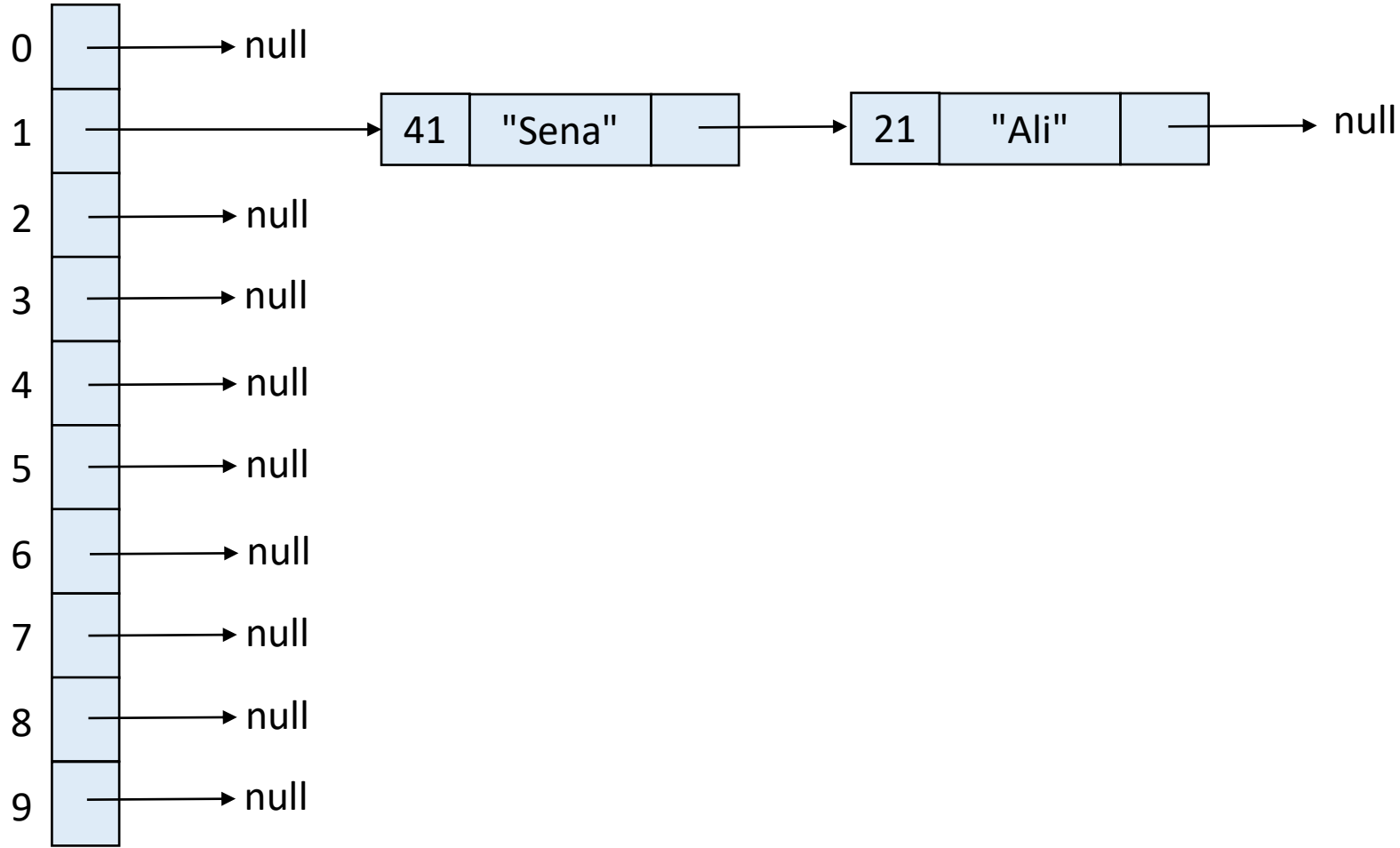
↑
HashDugumu[] kovalar



kovaSayisi = 10
buyukluk = 2

↑
HashDugumu[] kovalar

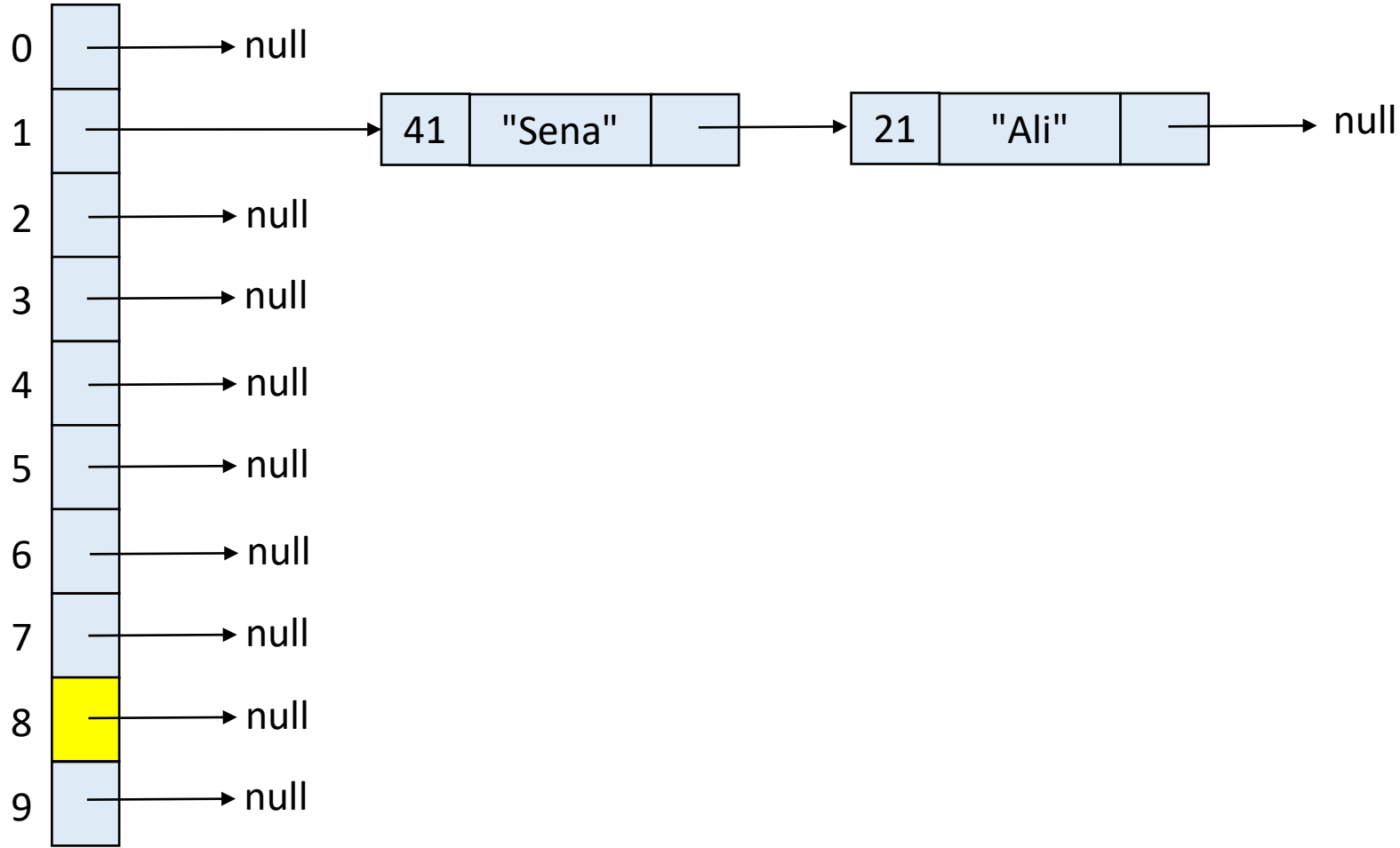
tablo.sil(88);



kovaSayisi = 10
buyukluk = 2
anahtar = 88

↑
HashDugumu[] kovalar

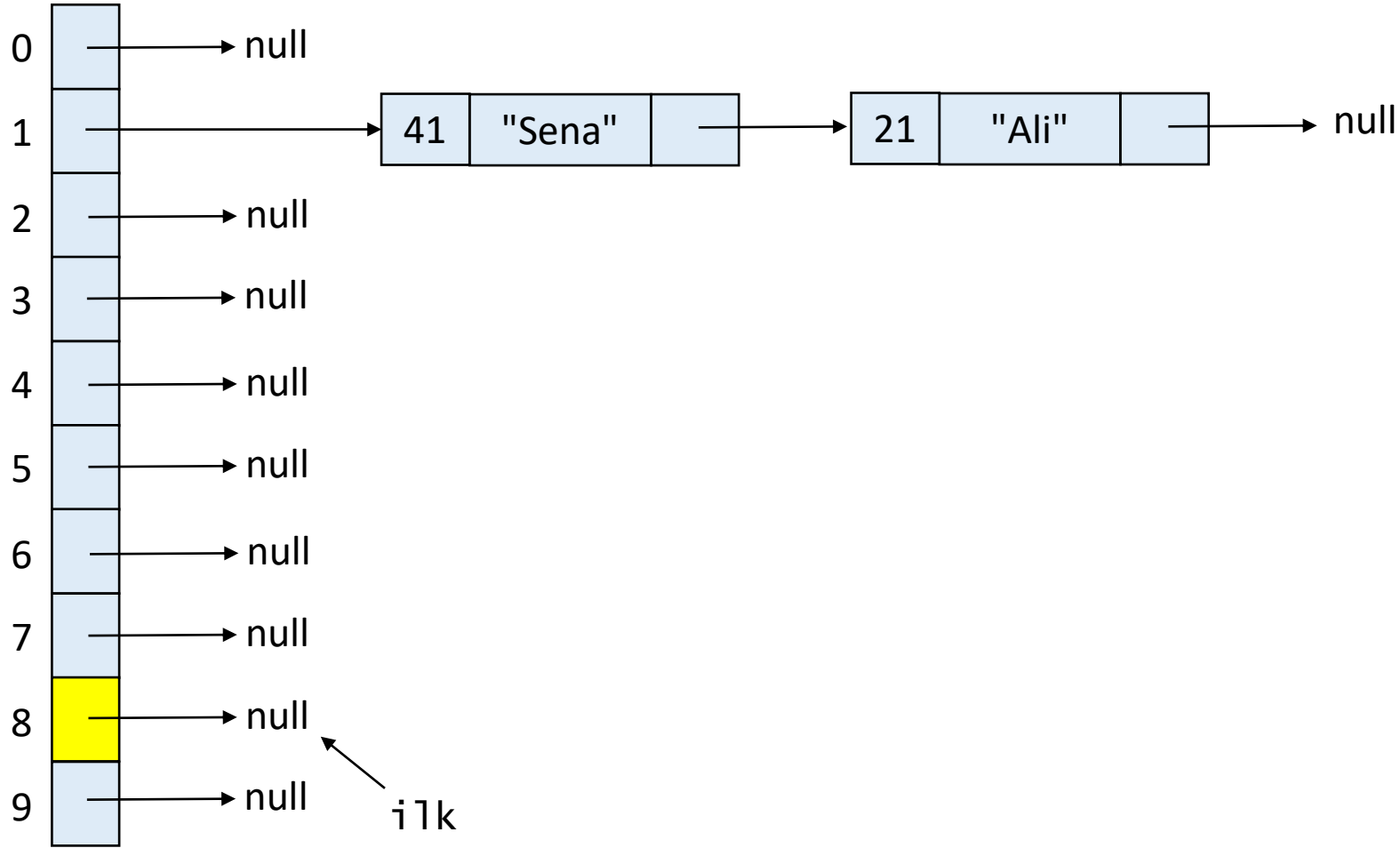
tablo.sil(88);



kovaSayisi = 10
buyukluk = 2
anahtar = 88
kovaIndeksi = 8

↑
HashDugumu[] kovalar

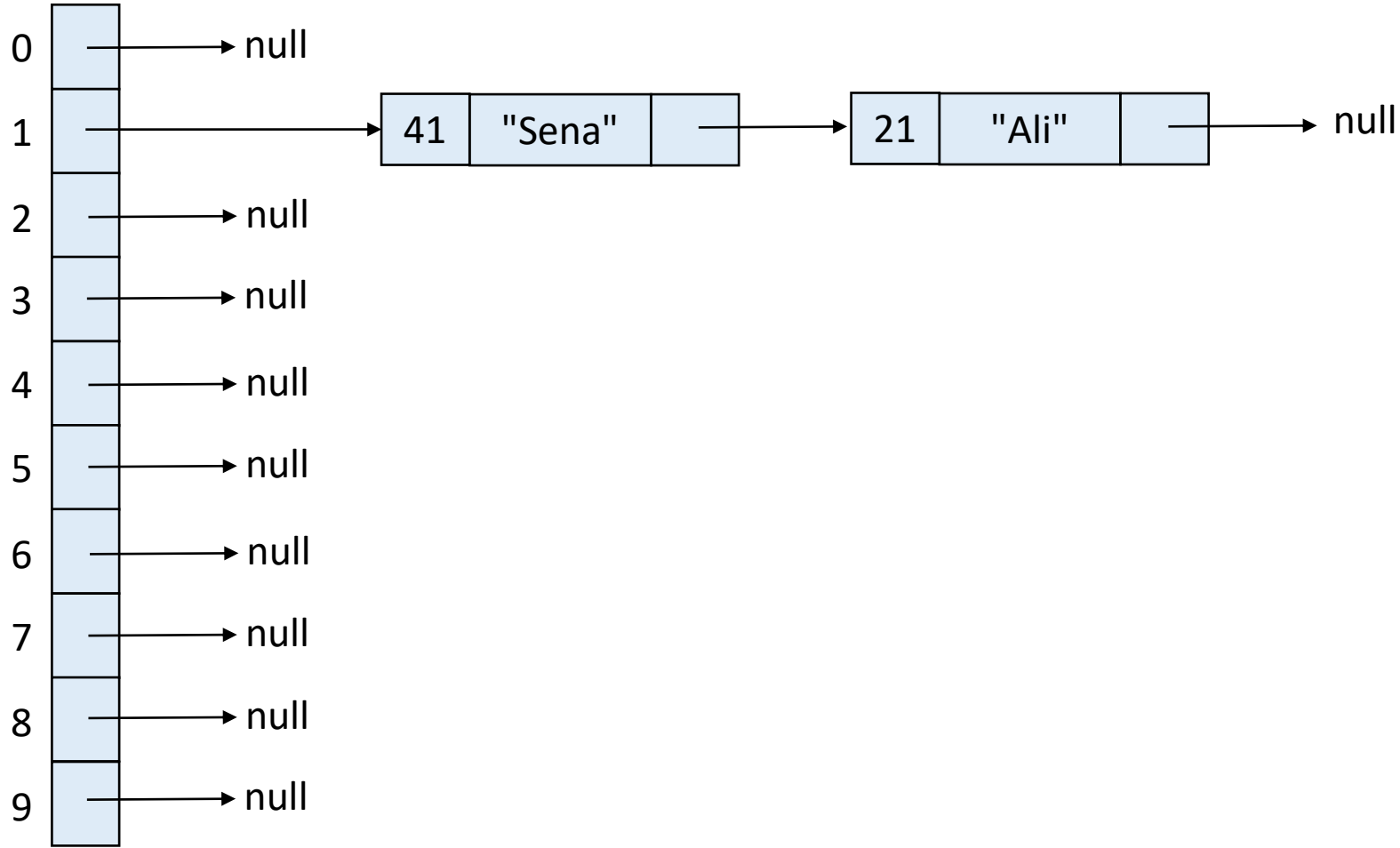
tablo.sil(88);



kovaSayisi = 10
buyukluk = 2
anahtar = 88
kovaIndeksi = 8

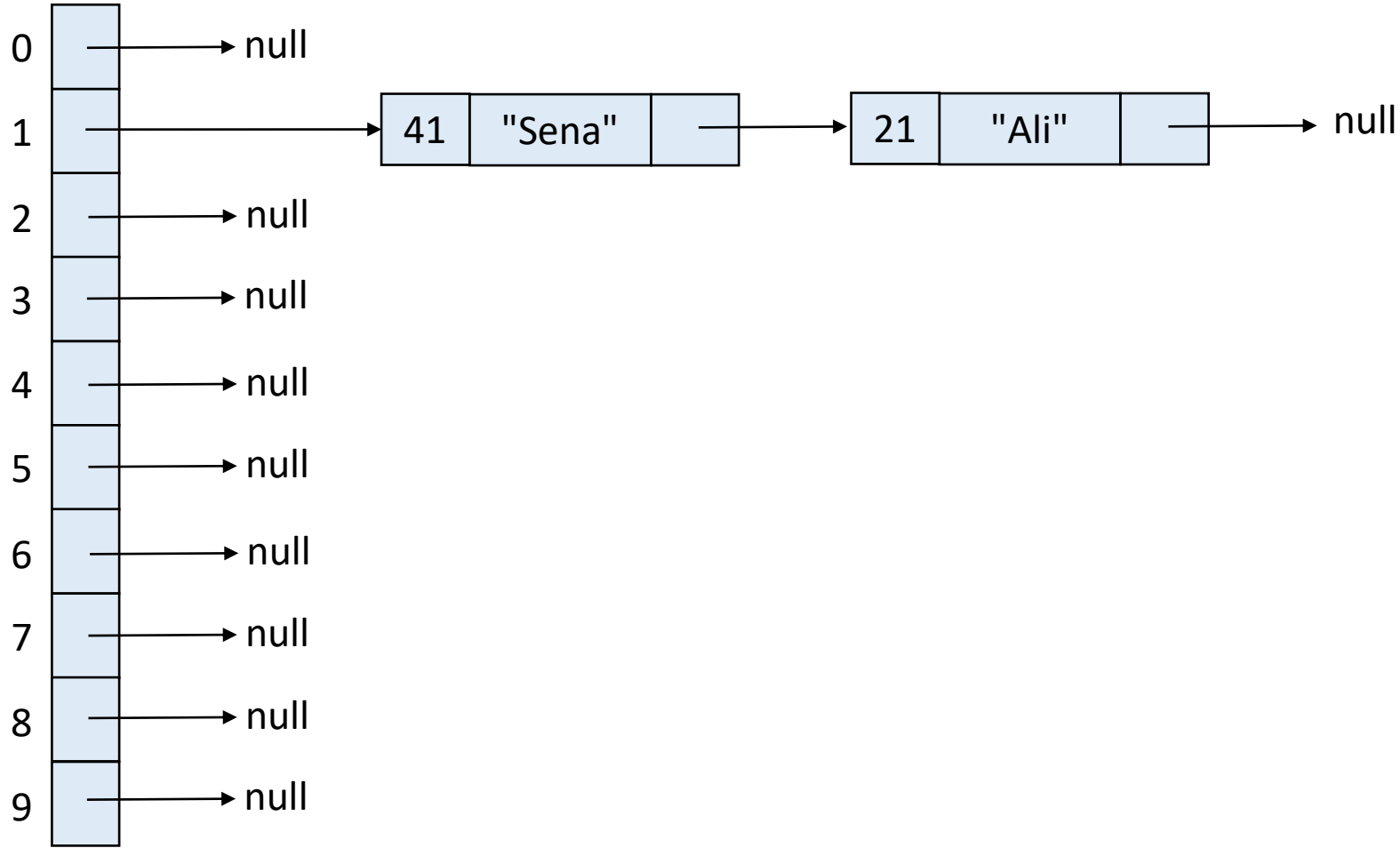
↑ HashDugumu[] kovalar

tablo.sil(88);



kovaSayisi = 10
buyukluk = 2

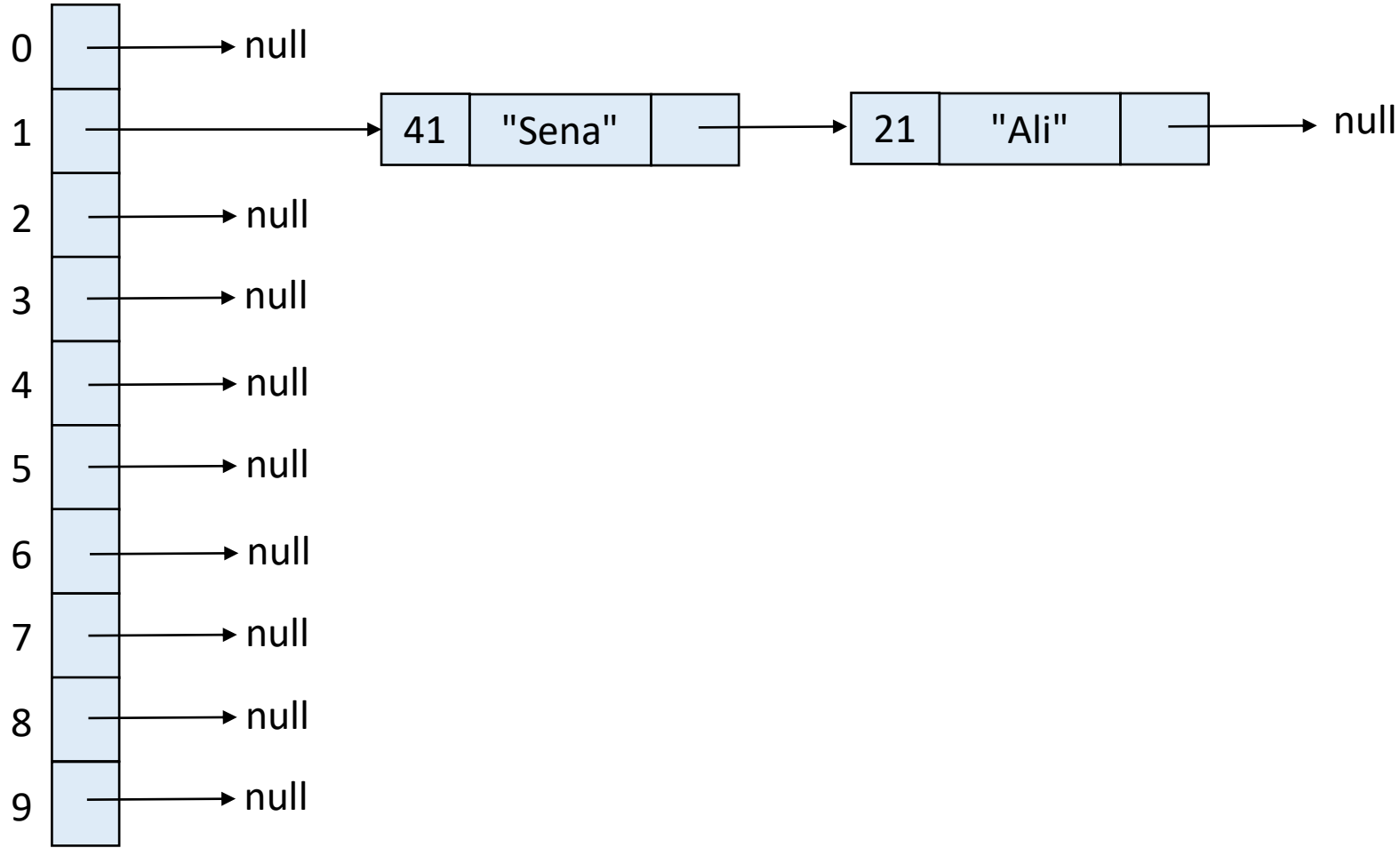
↑
HashDugumu[] kovalar



kovaSayisi = 10
buyukluk = 2

↑
HashDugumu[] kovalar

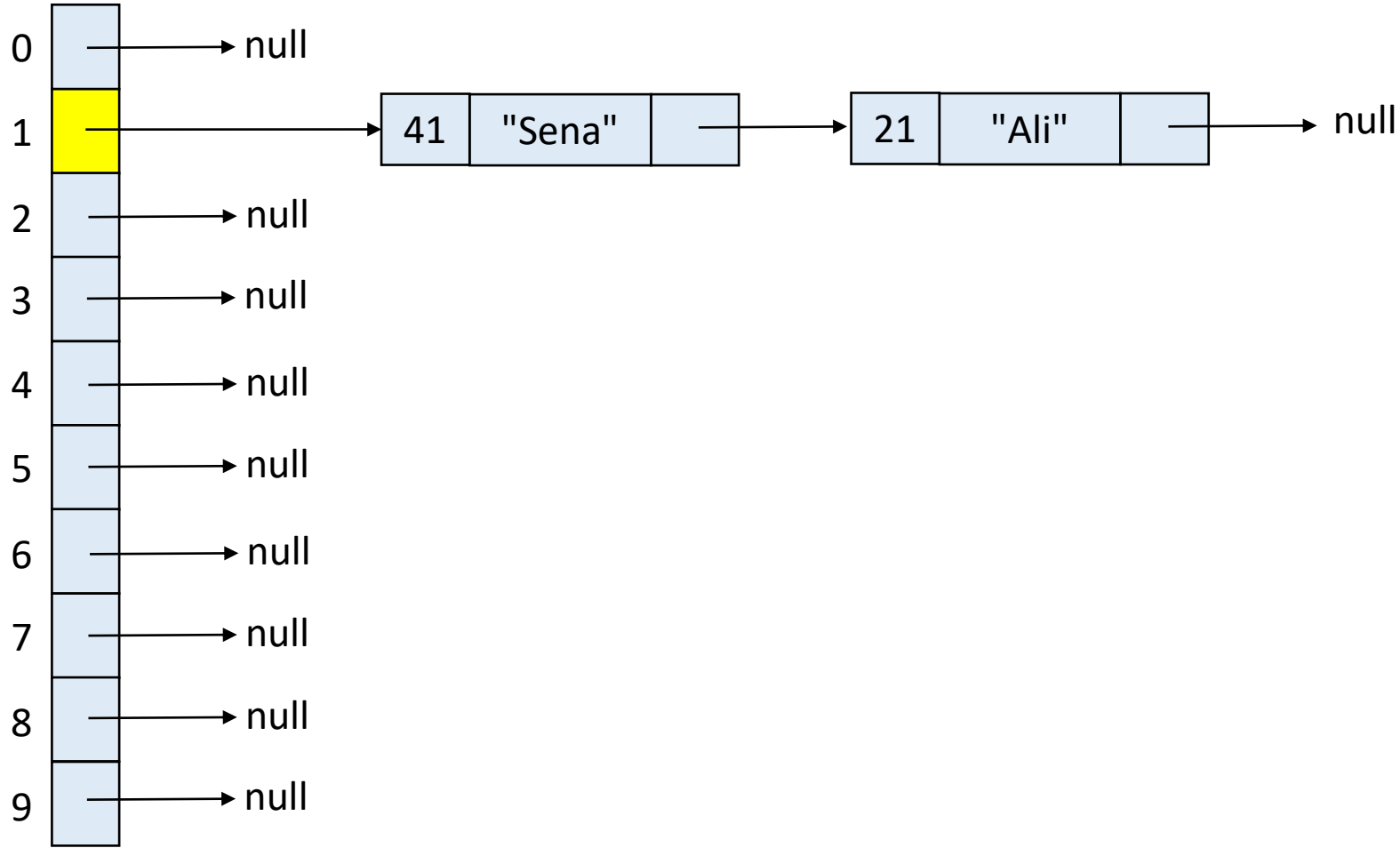
tablo.sil(21);



kovaSayisi = 10
buyukluk = 2
anahtar = 21

↑
HashDugumu[] kovalar

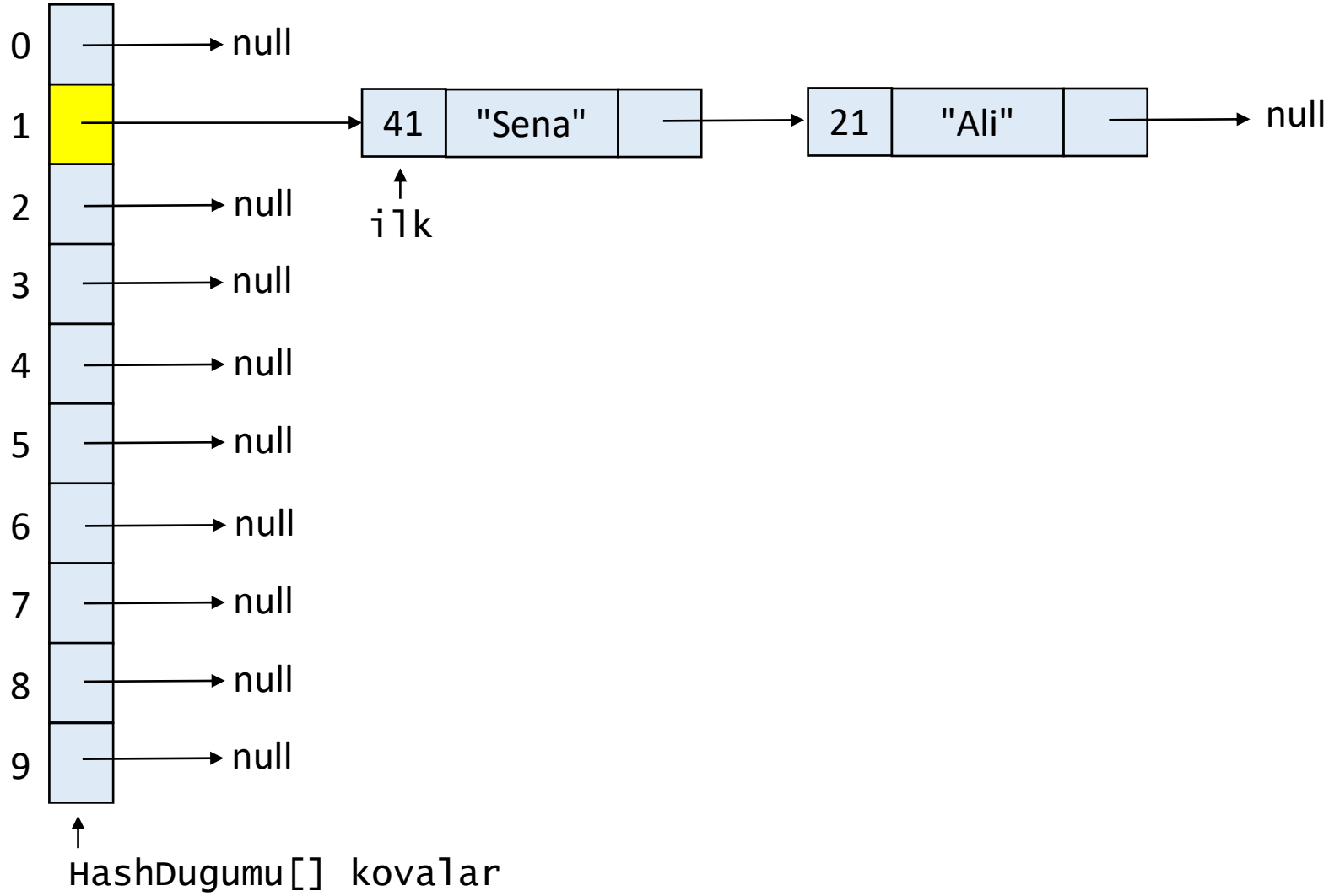
tablo.sil(21);



kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

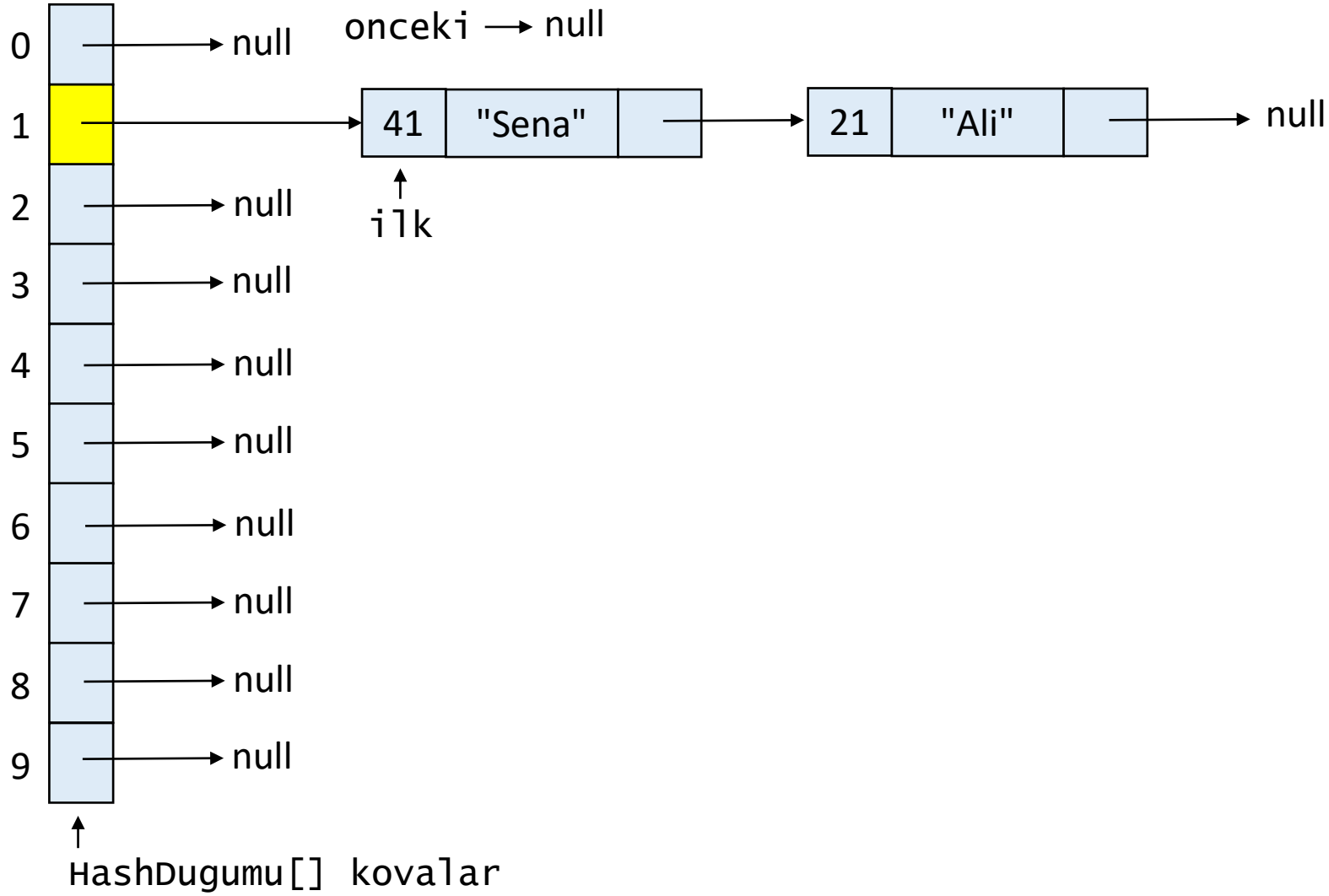
↑
HashDugumu[] kovalar

tablo.sil(21);



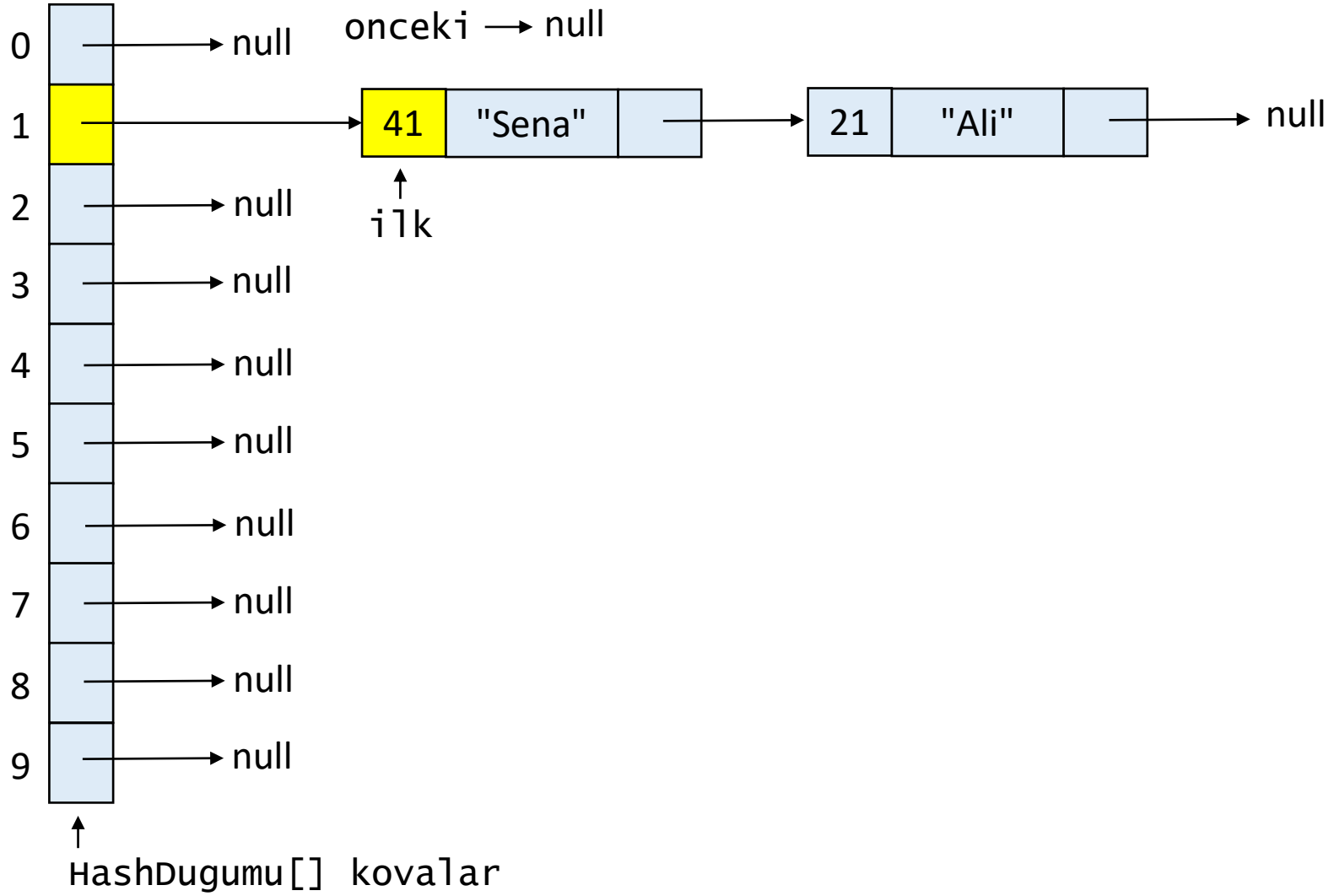
kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



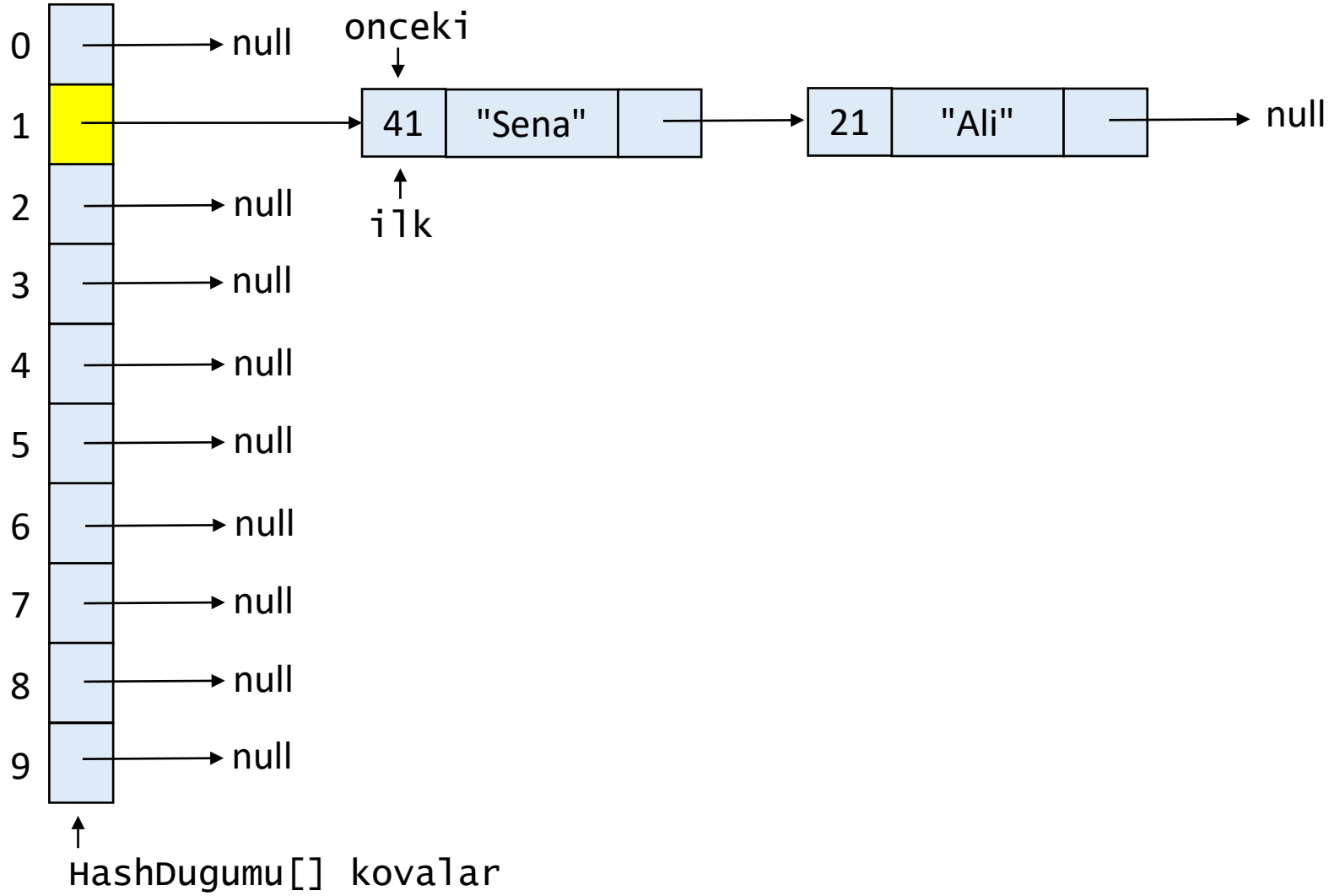
kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



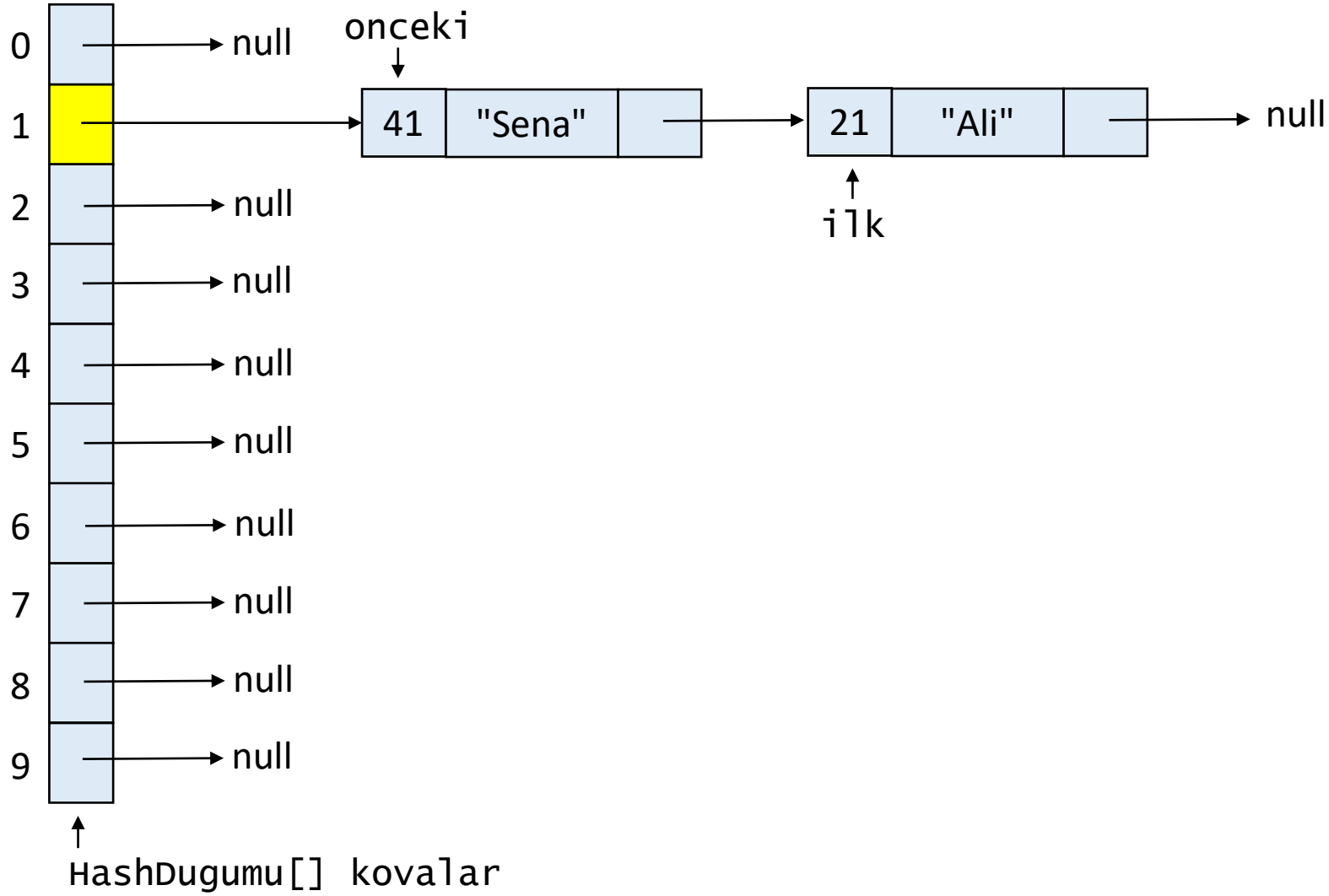
kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



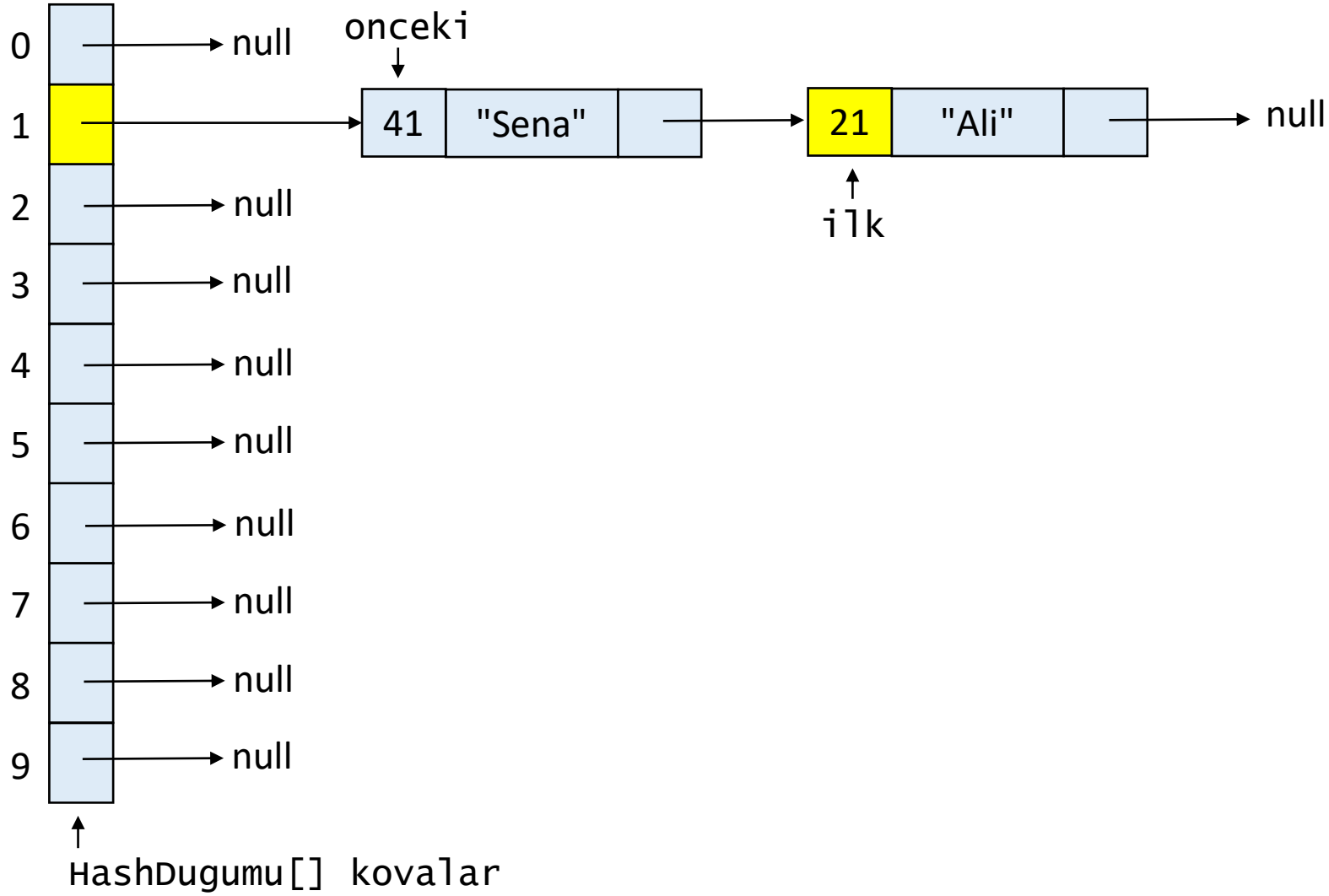
kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



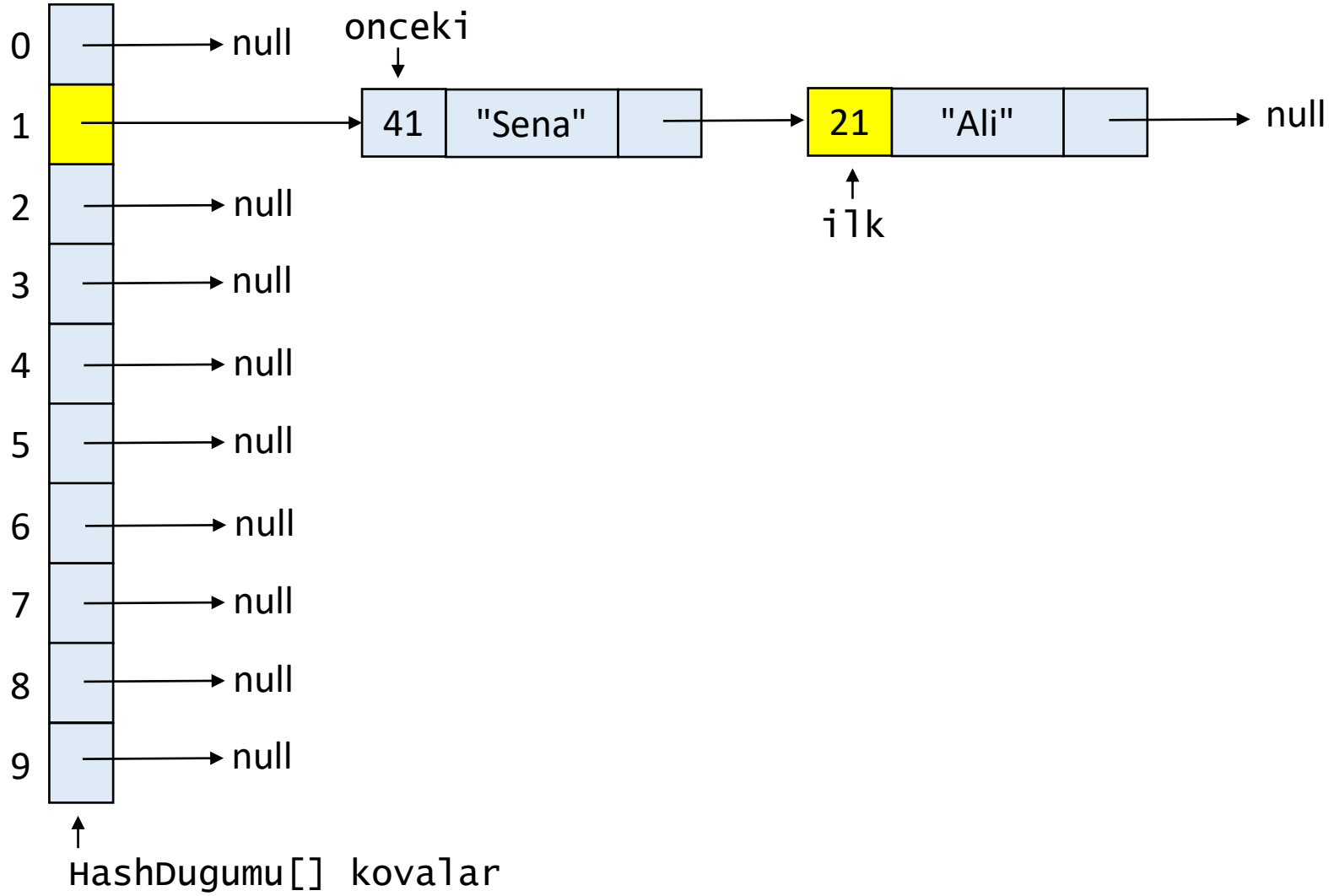
kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```

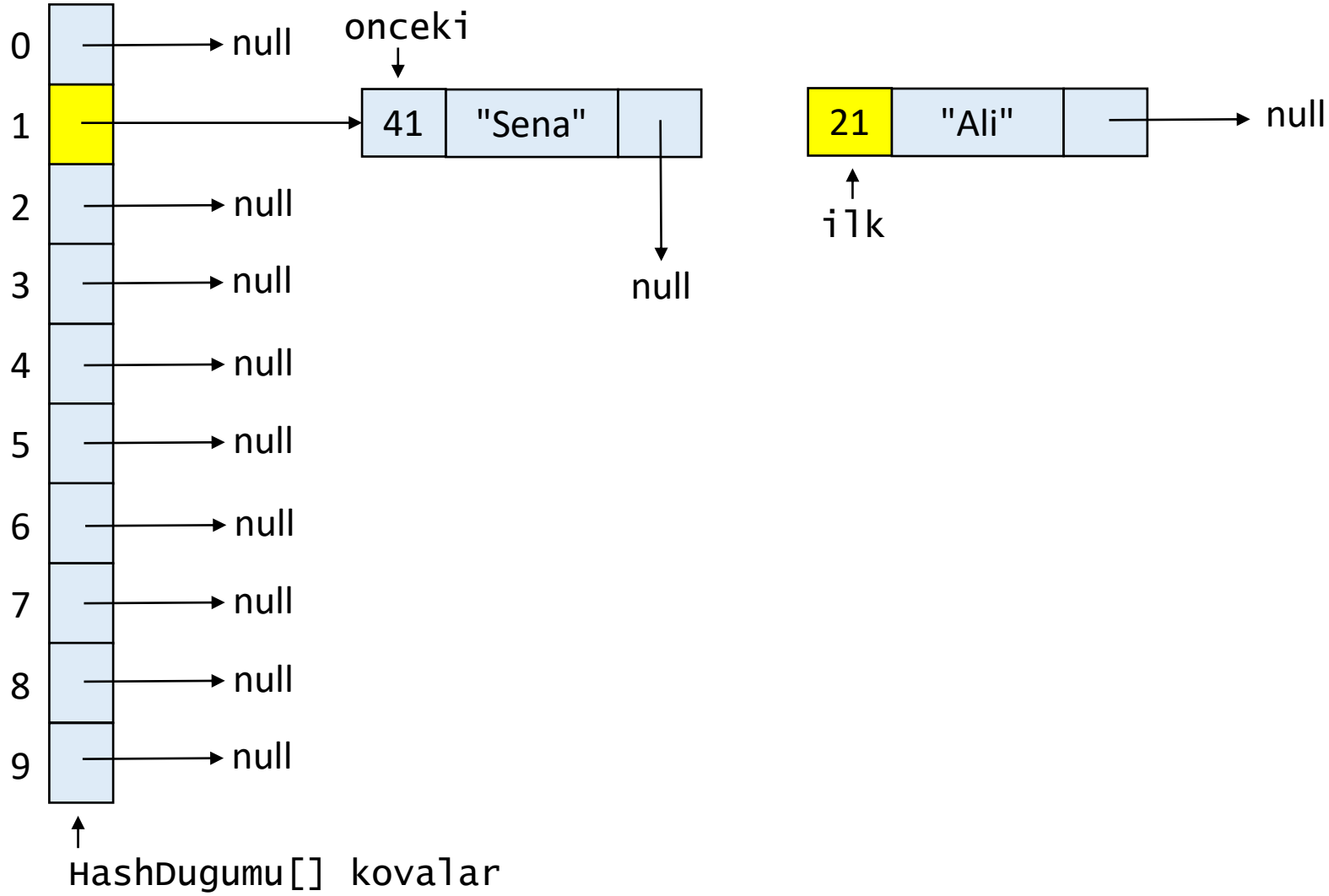
kovaSayisi = 10
buyukluk = 2
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



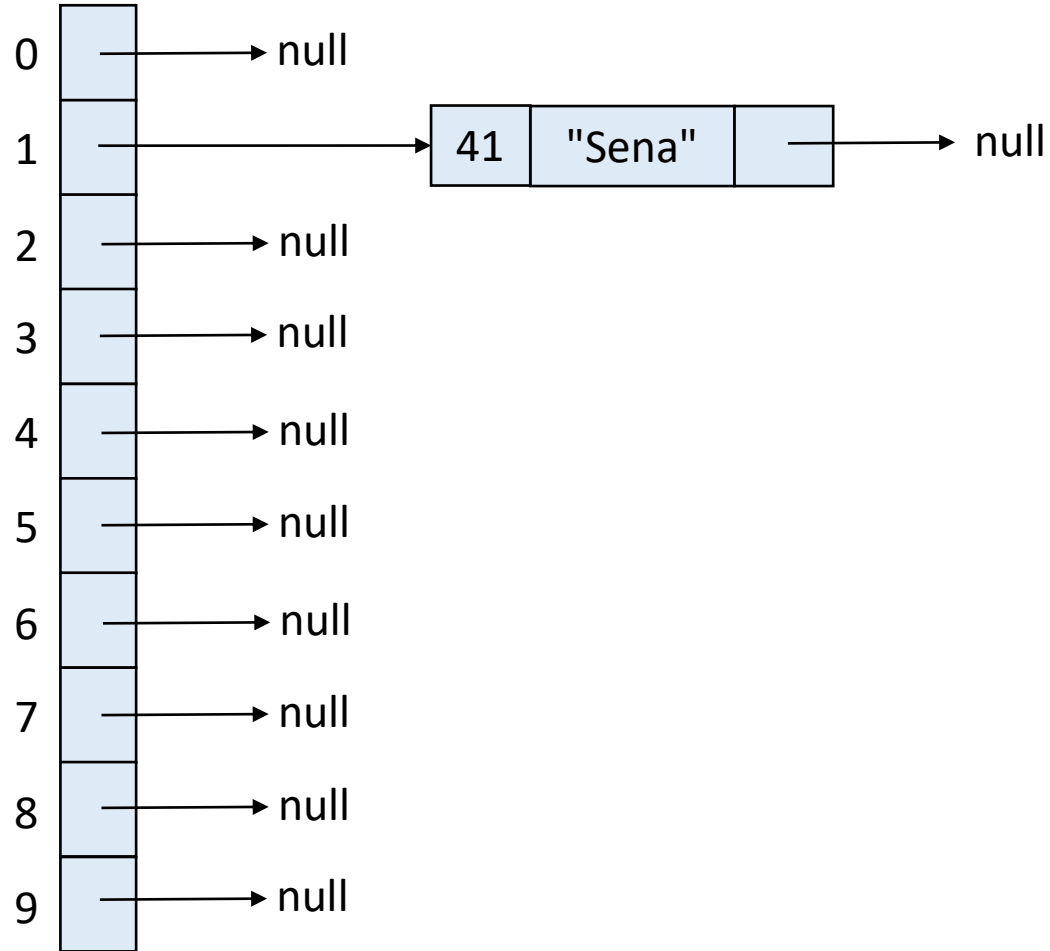
kovaSayisi = 10
buyukluk = 1
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



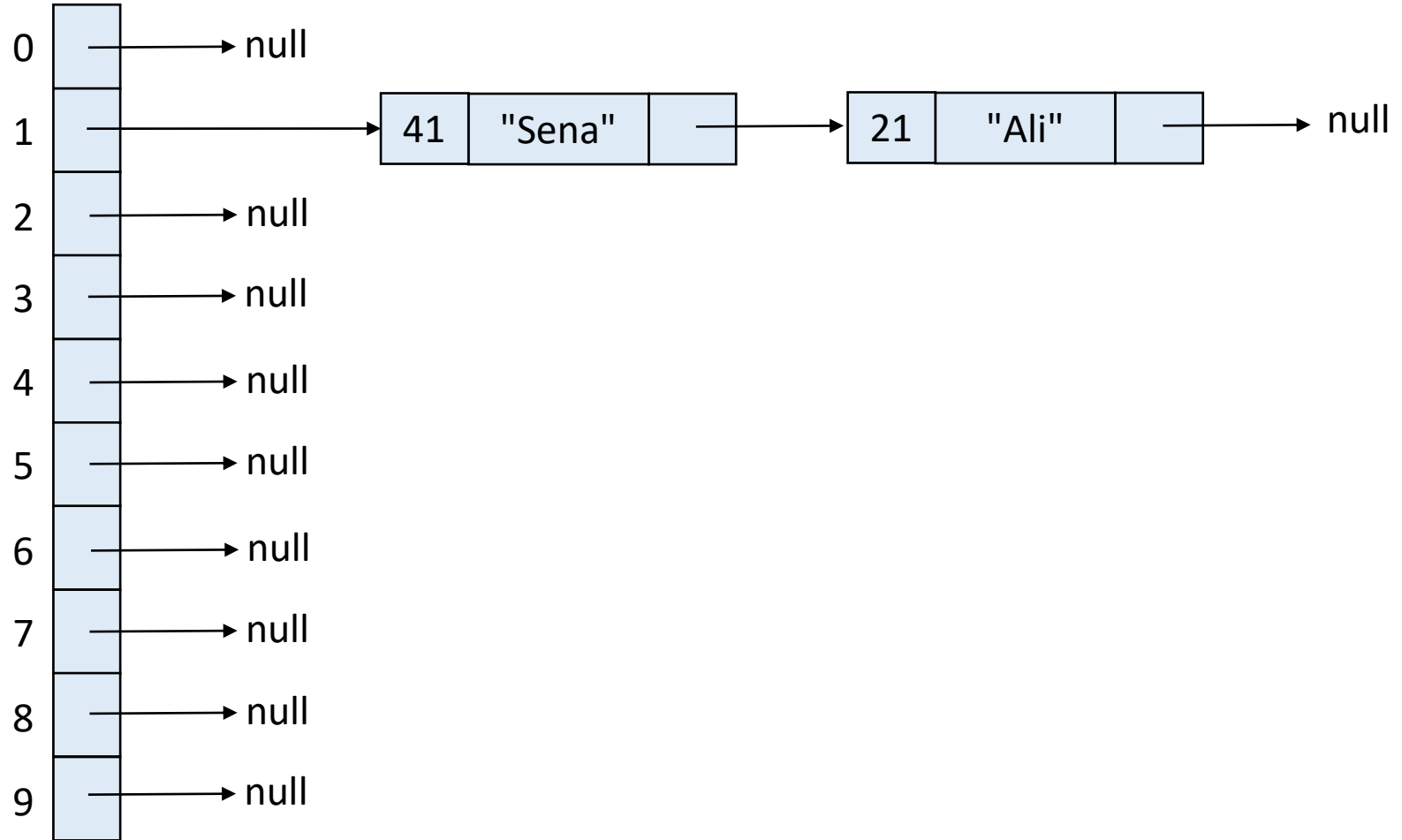
kovaSayisi = 10
buyukluk = 1
anahtar = 21
kovaIndeksi = 1

```
tablo.sil(21);
```



kovaSayisi = 10
buyukluk = 1

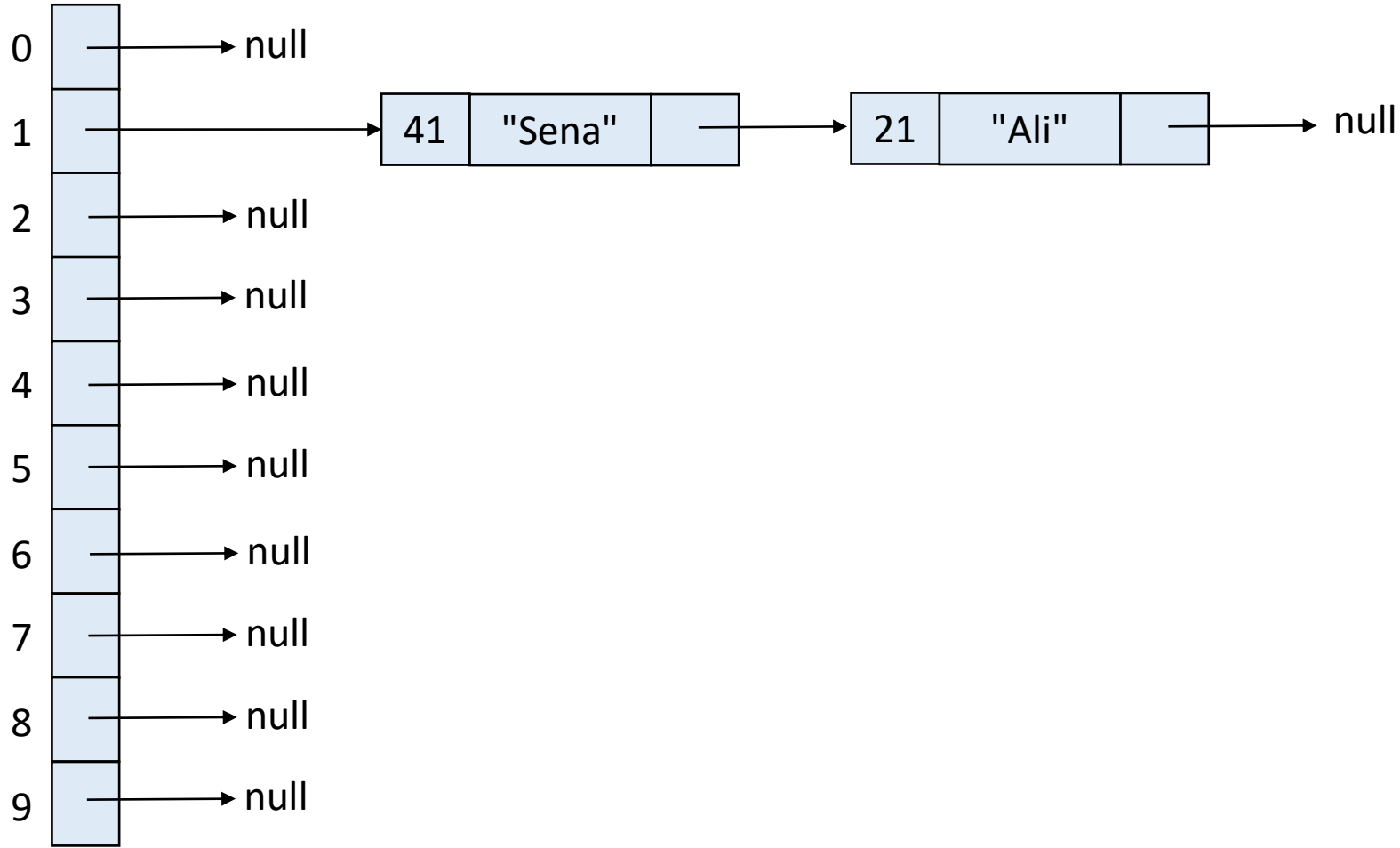
↑
HashDugumu[] kovalar



kovaSayisi = 10
buyukluk = 2

↑
HashDugumu[] kovalar

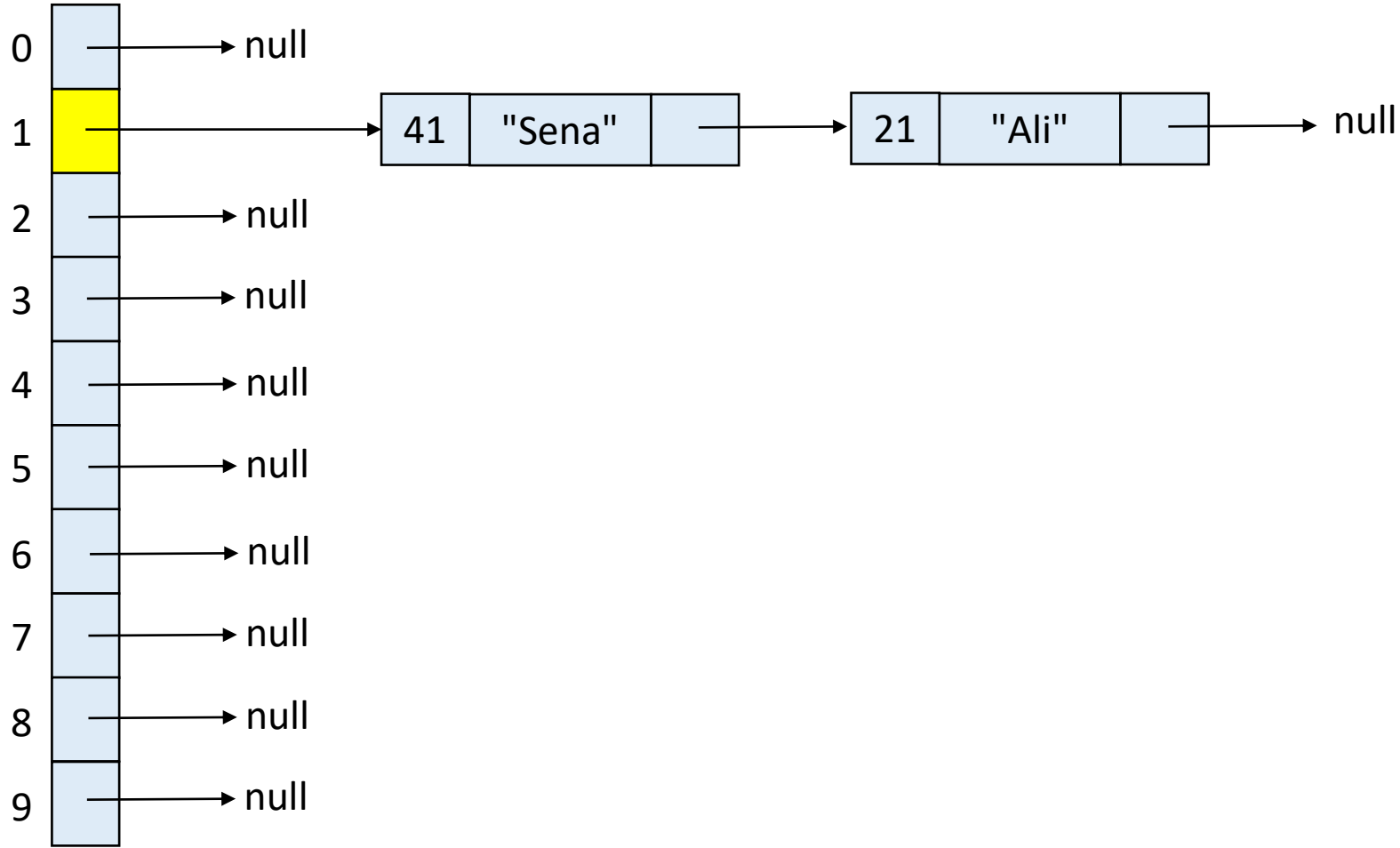
tablo.sil(41);



kovaSayisi = 10
buyukluk = 2
anahtar = 41

↑
HashDugumu[] kovalar

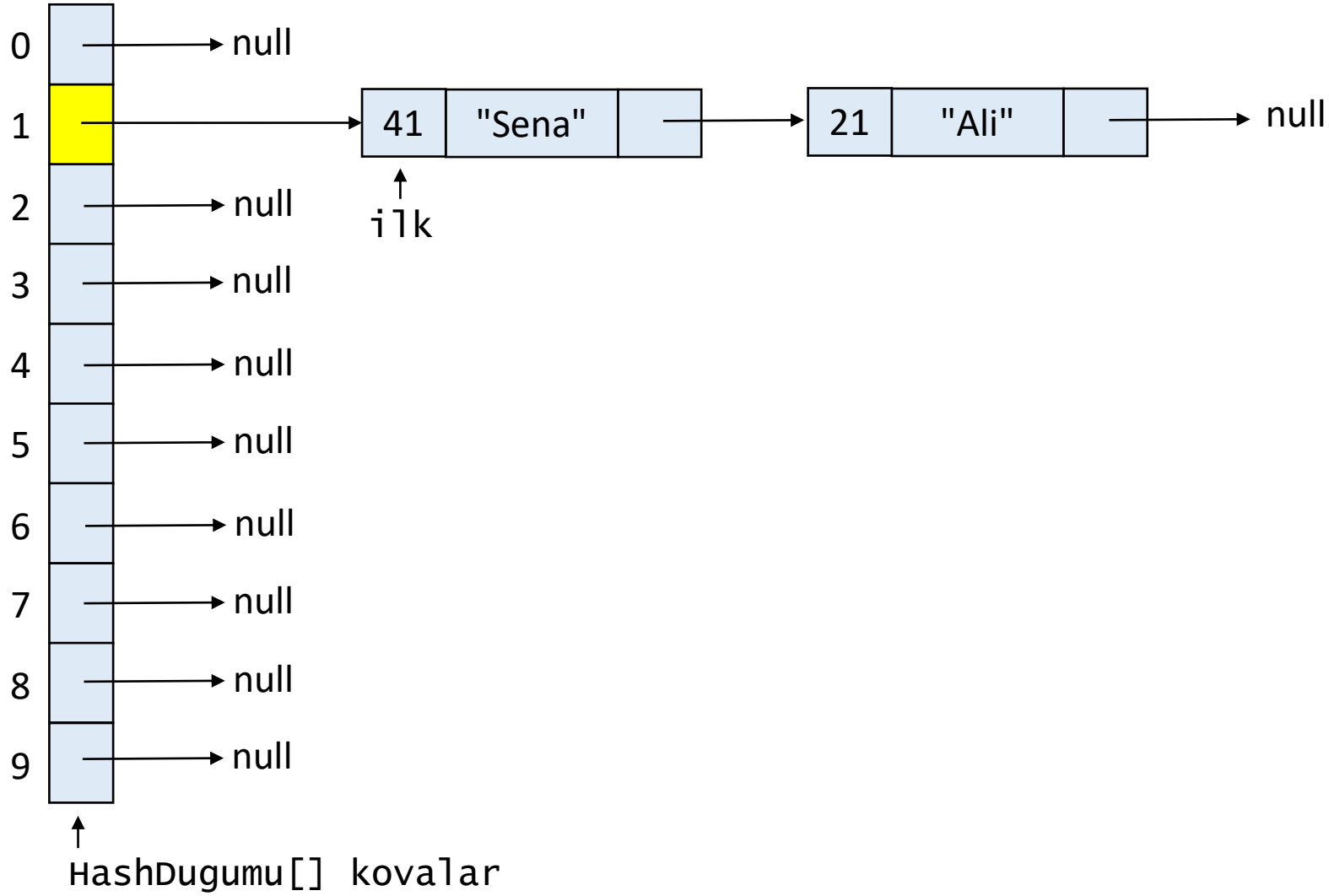
tablo.sil(41);



kovaSayisi = 10
buyukluk = 2
anahtar = 41
kovaIndeksi = 1

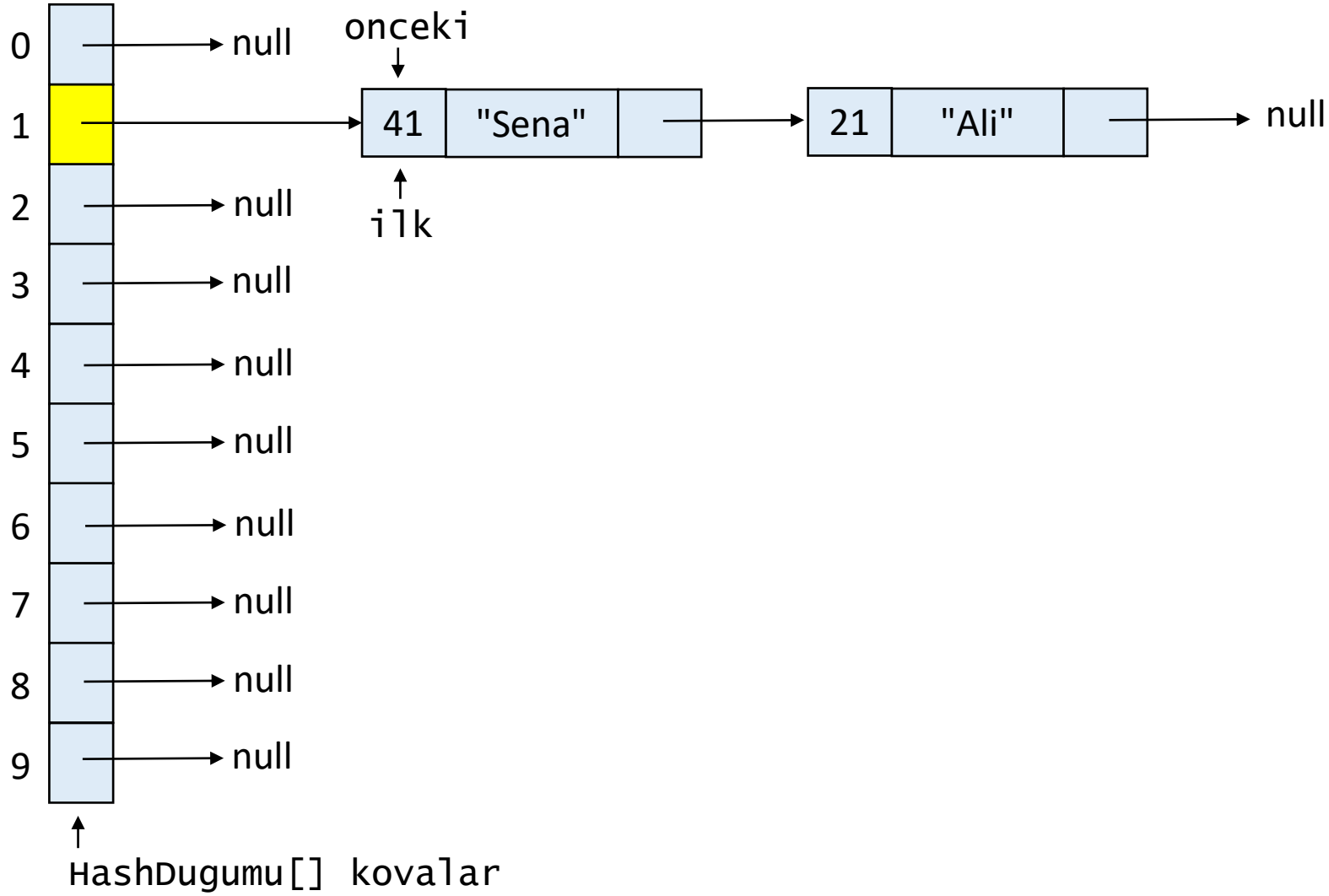
↑
HashDugumu[] kovalar

tablo.sil(41);



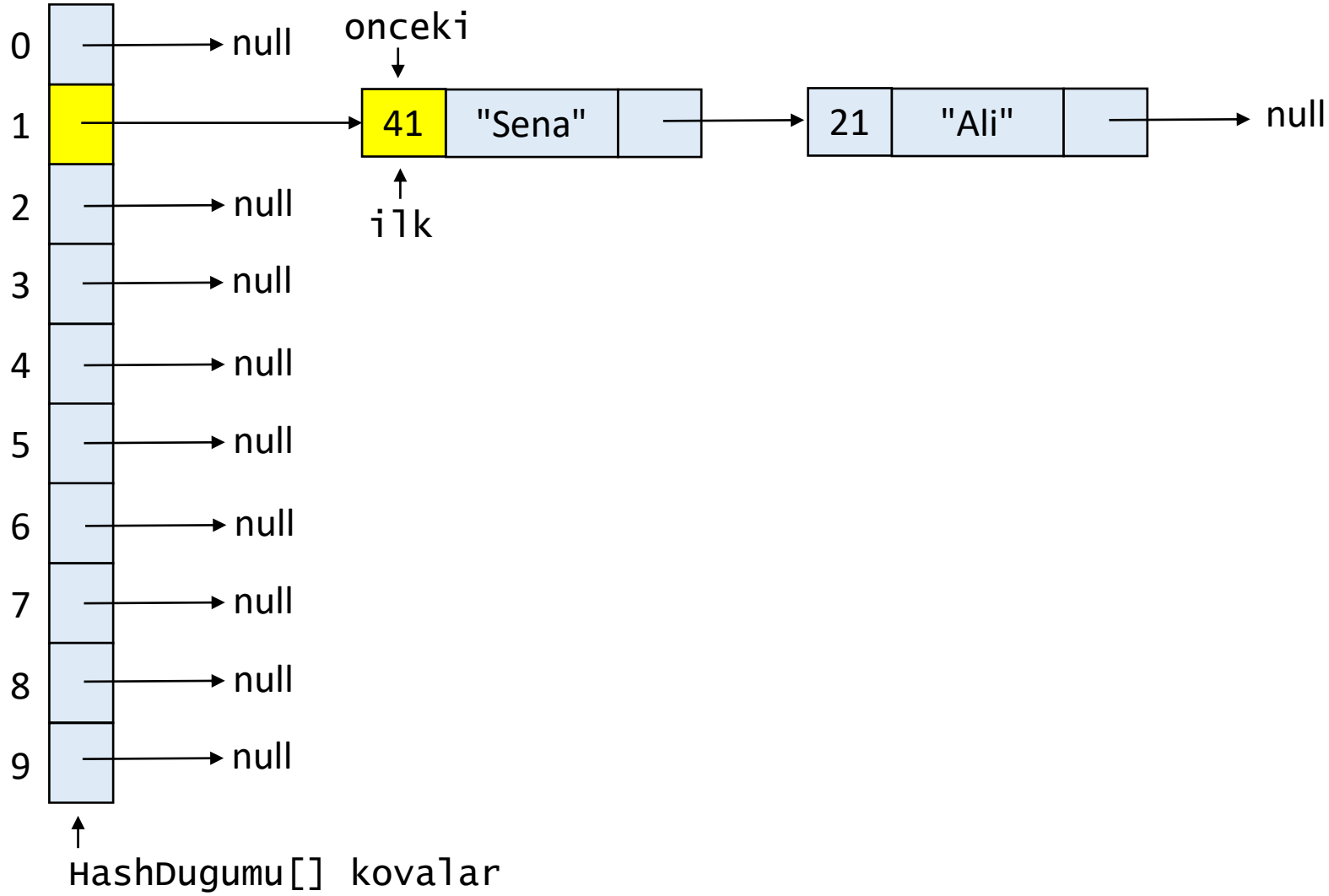
kovaSayisi = 10
buyukluk = 2
anahtar = 41
kovaIndeksi = 1

```
tablo.sil(41);
```

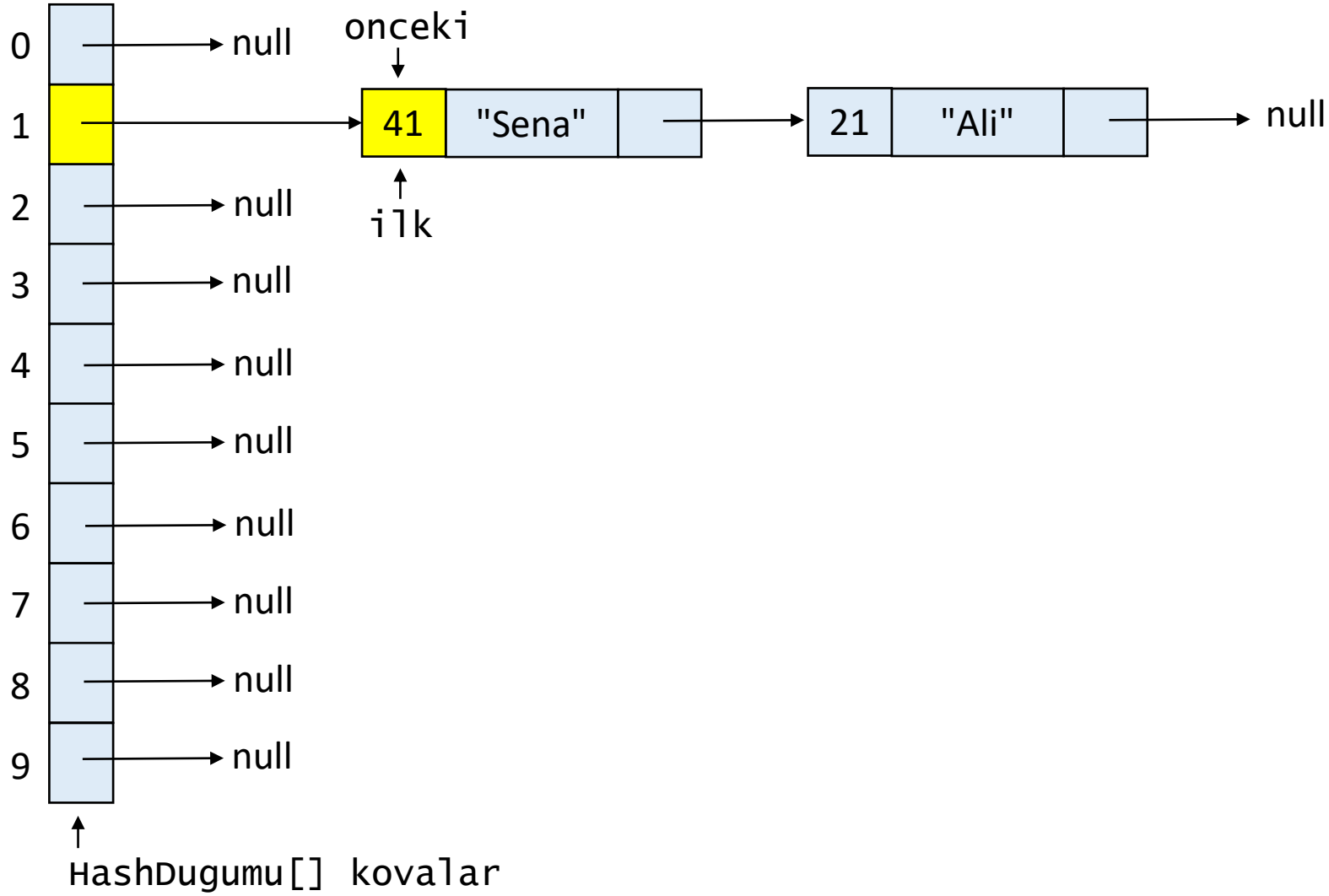
kovaSayisi = 10
buyukluk = 2
anahtar = 41
kovaIndeksi = 1

```
tablo.sil(41);
```



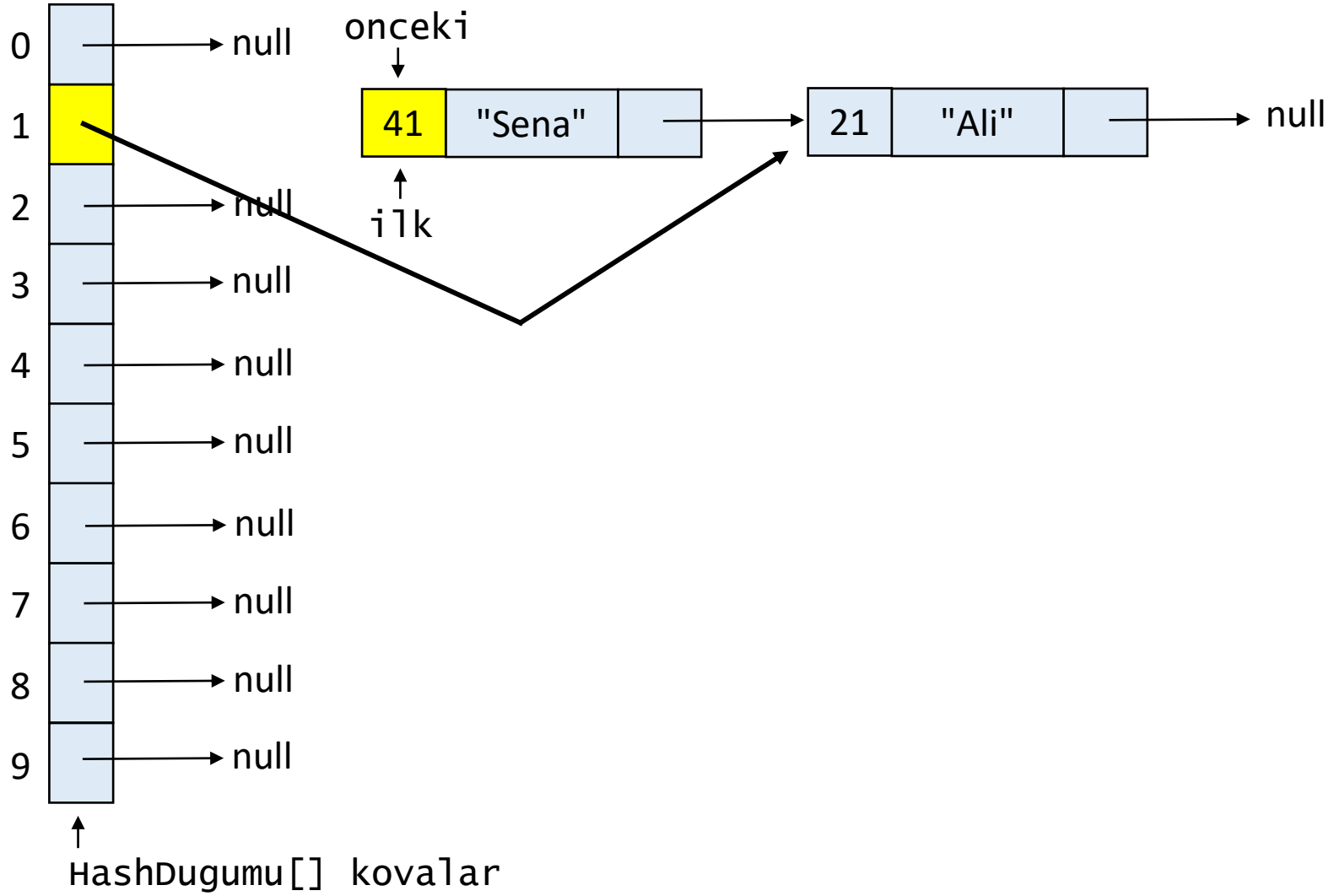
kovaSayisi = 10
buyukluk = 2
anahtar = 41
kovaIndeksi = 1

```
tablo.sil(41);
```



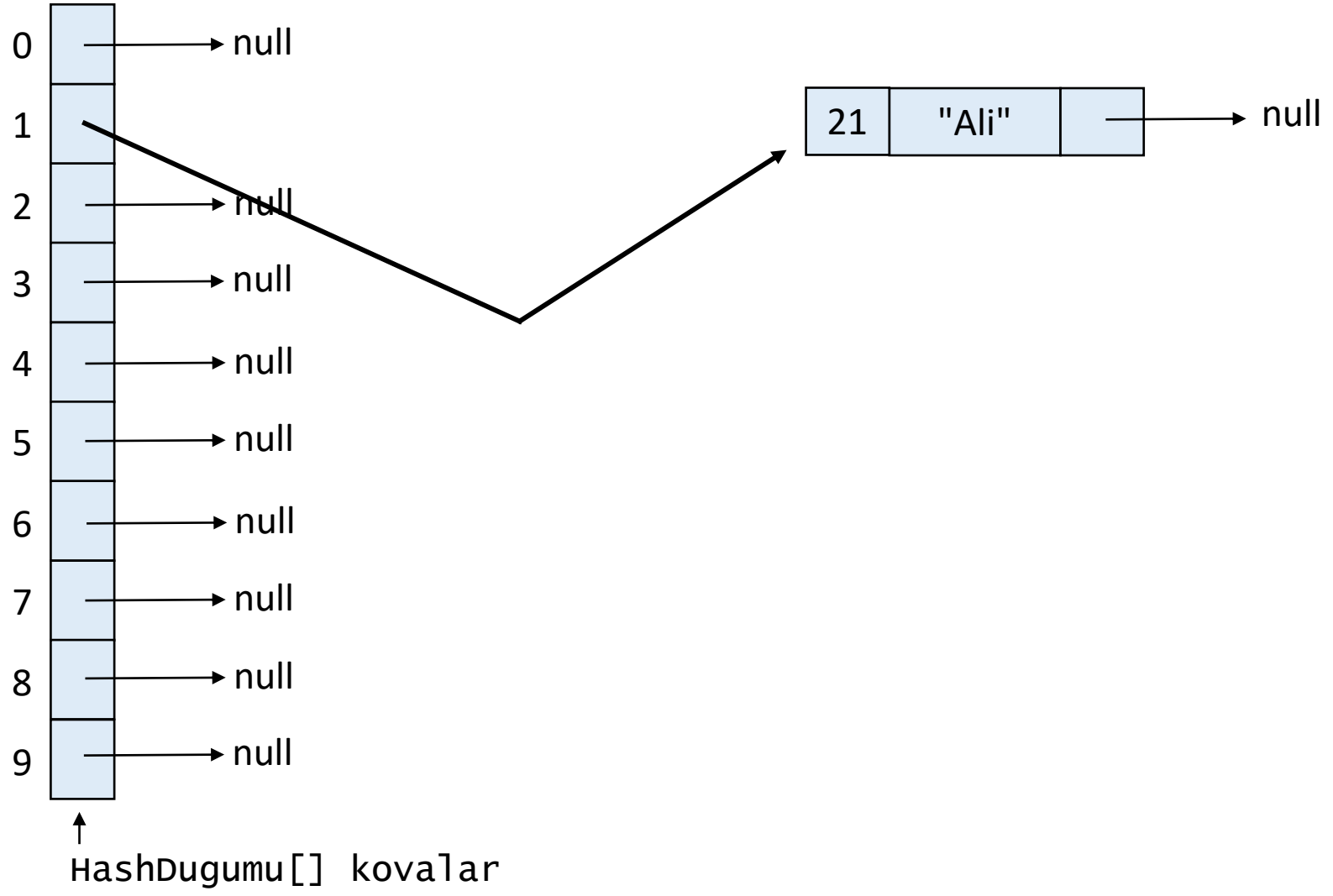
kovaSayisi = 10
buyukluk = 1
anahtar = 41
kovaIndeksi = 1

```
tablo.sil(41);
```

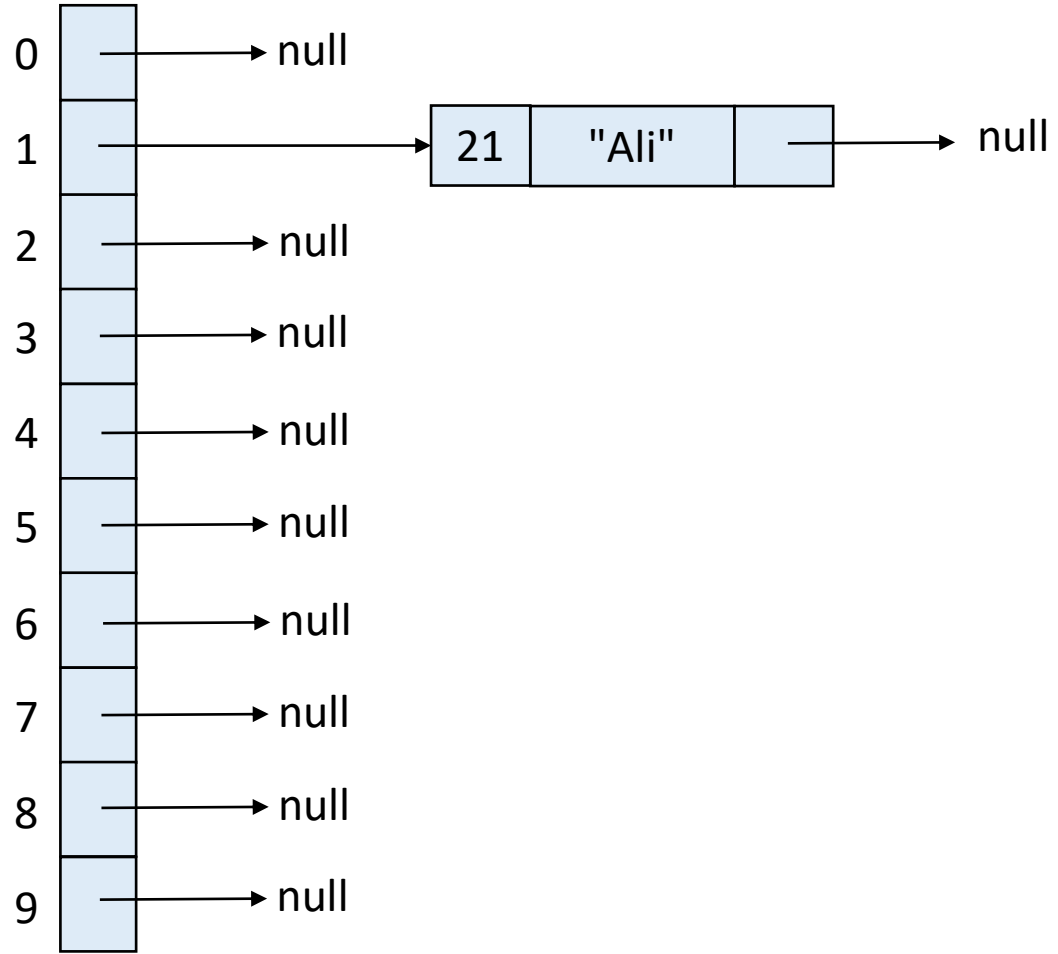


kovaSayisi = 10
buyukluk = 1
anahtar = 41
kovaIndeksi = 1

```
tablo.sil(41);
```



kovaSayisi = 10
buyukluk = 1

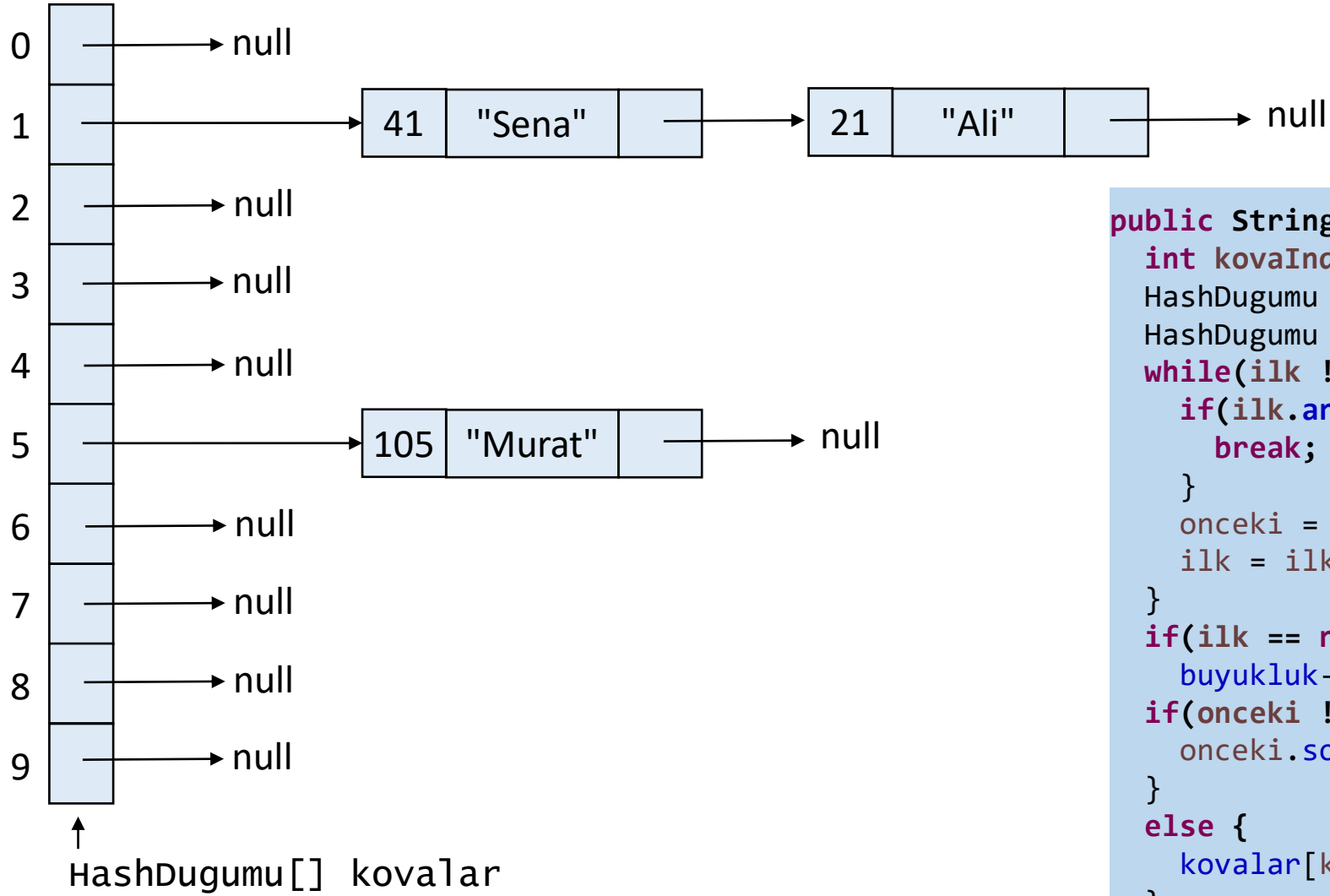


kovaSayisi = 10
buyukluk = 1

↑
HashDugumu[] kovalar

Hash Tablosundan Anahtar Silme



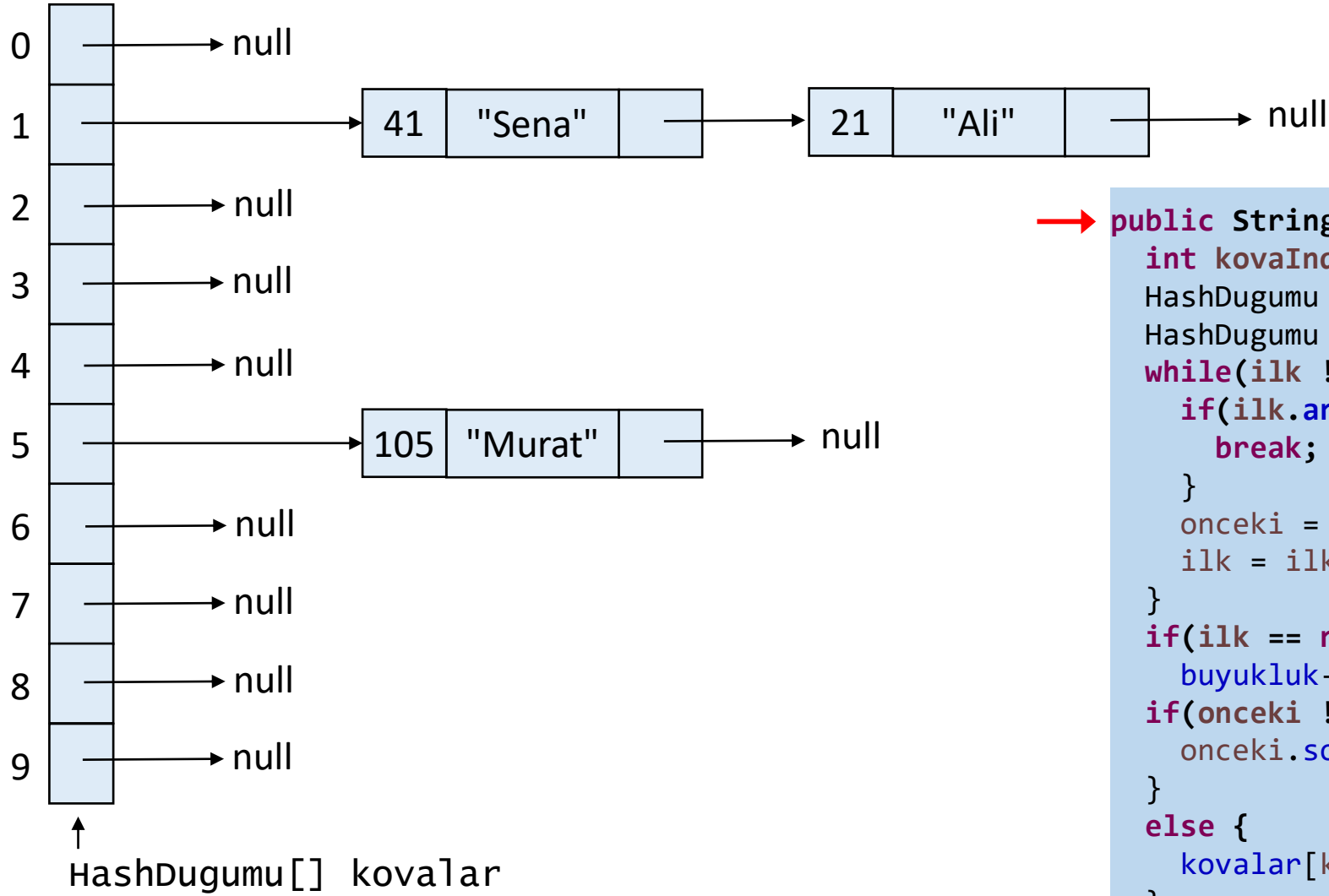


kovaSayisi = 10
buyukluk = 3

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

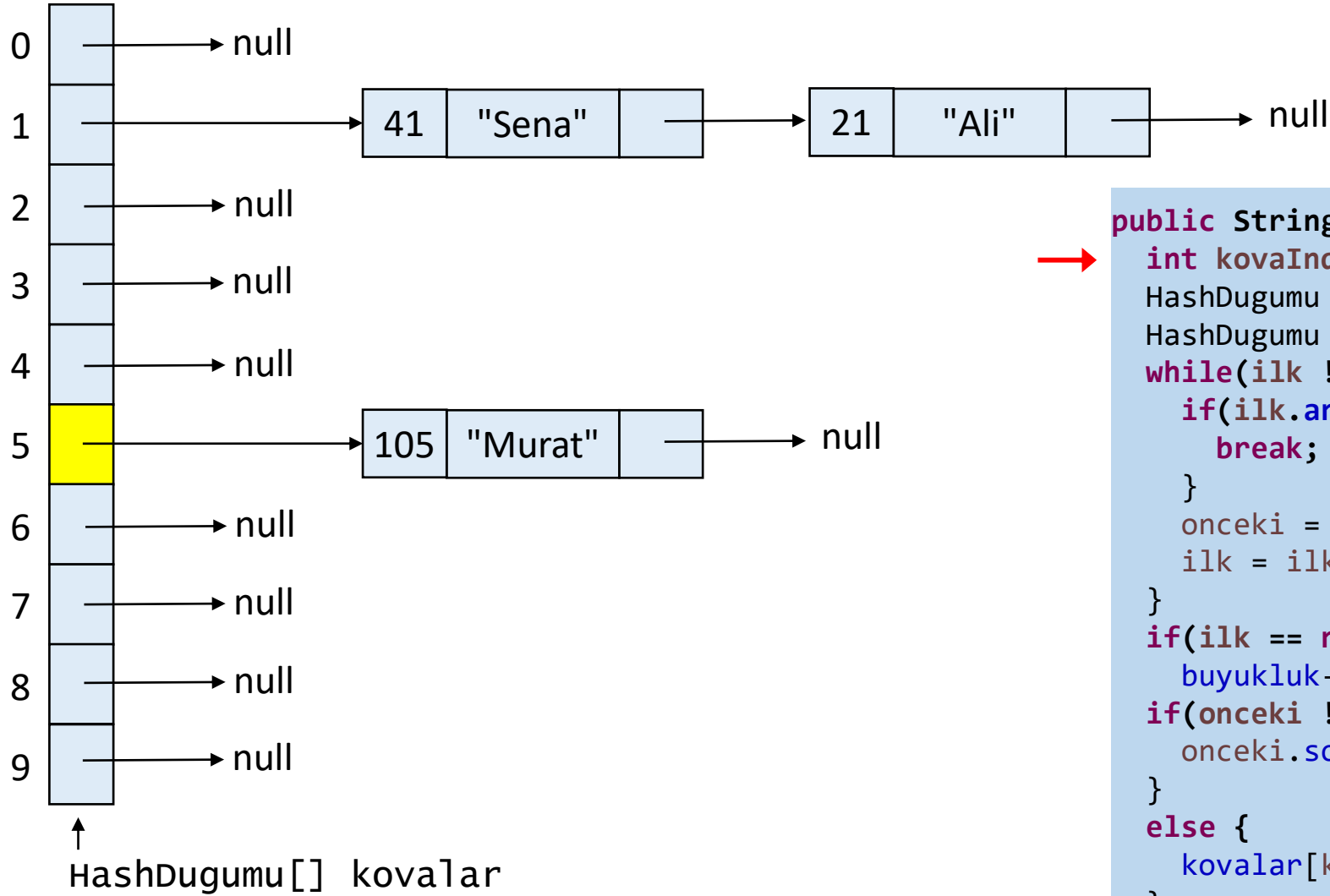
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105

```

→ public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(105);



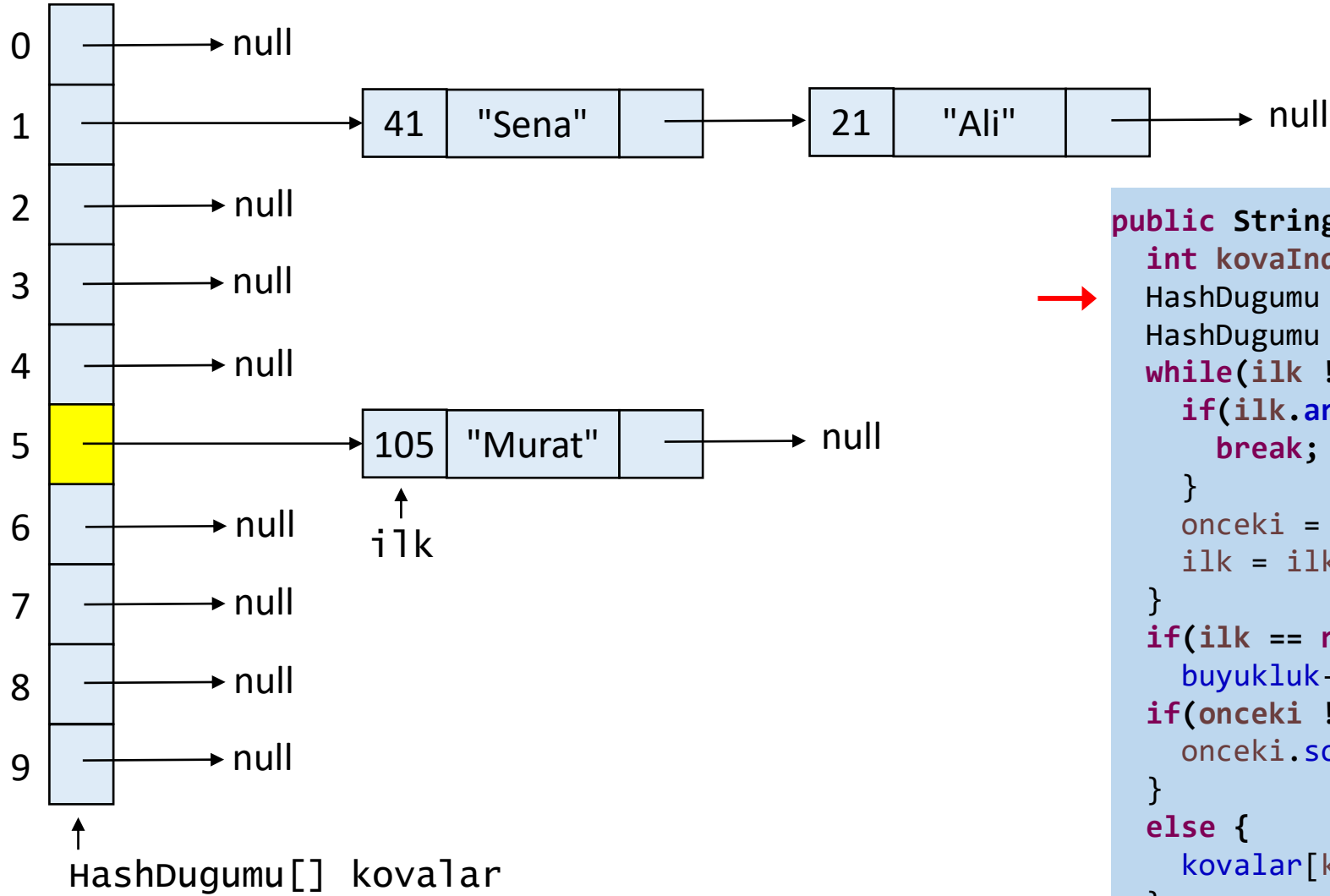
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(105);



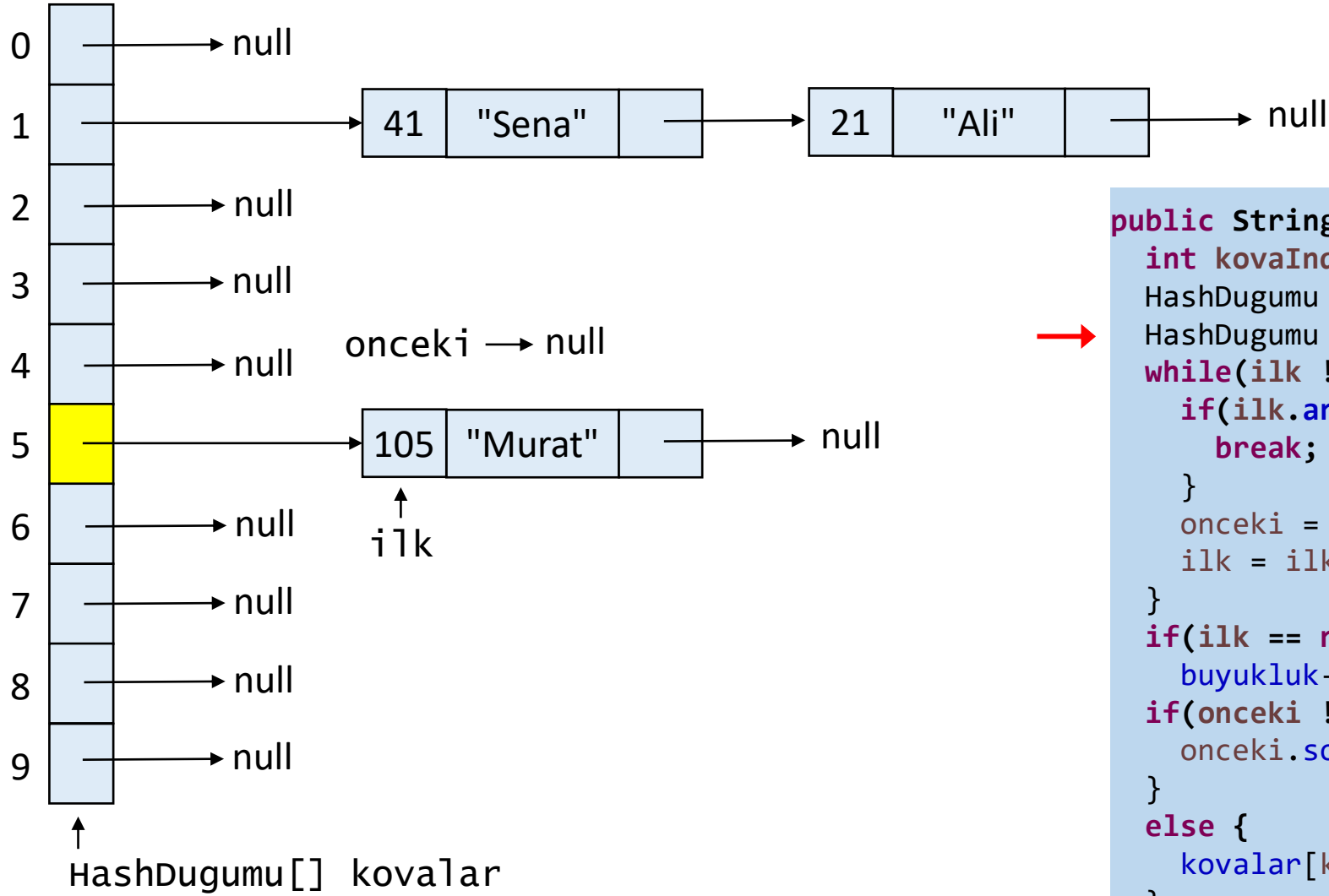
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

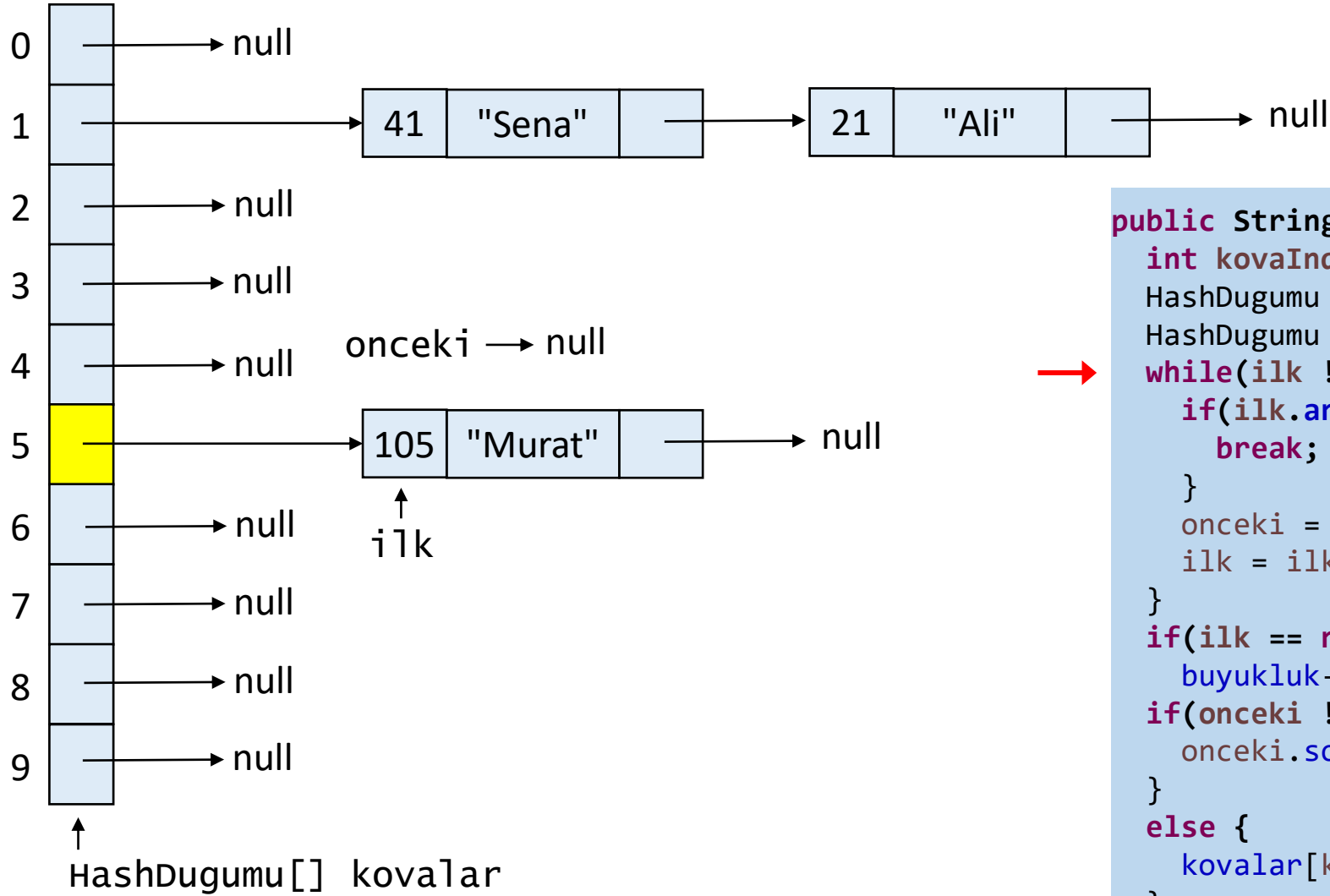
tablo.sil(105);



kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(105);



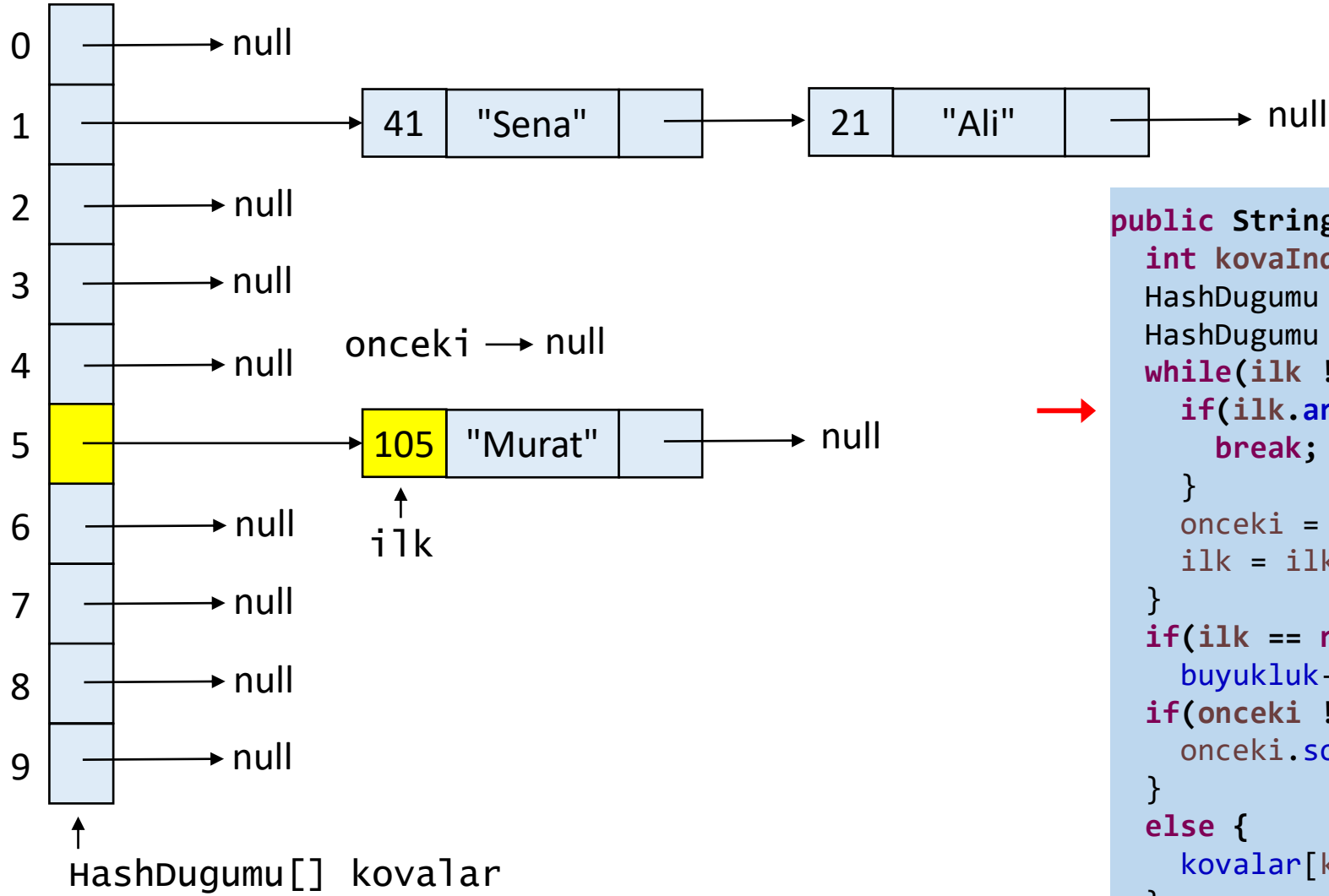
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(105);



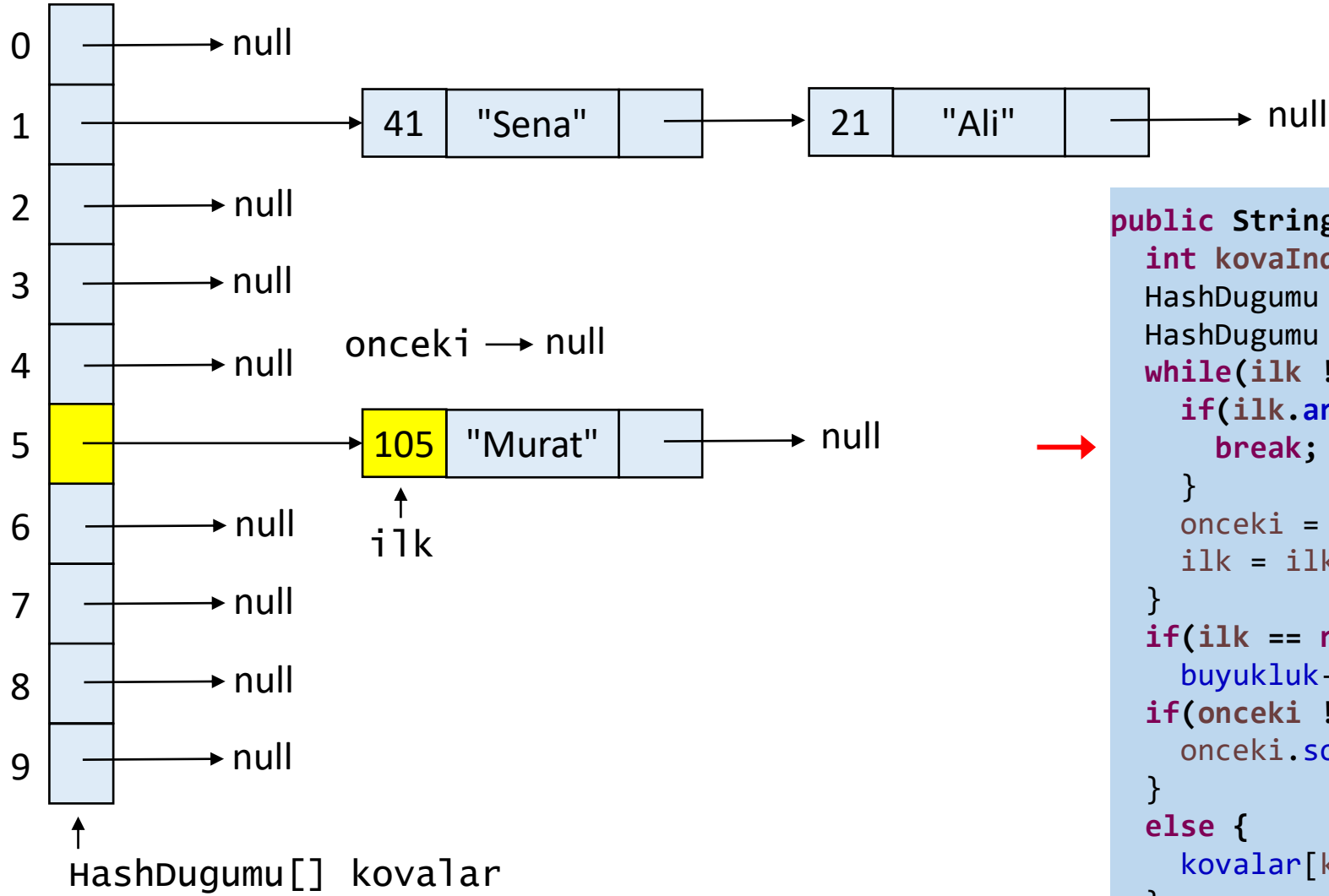
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(105);



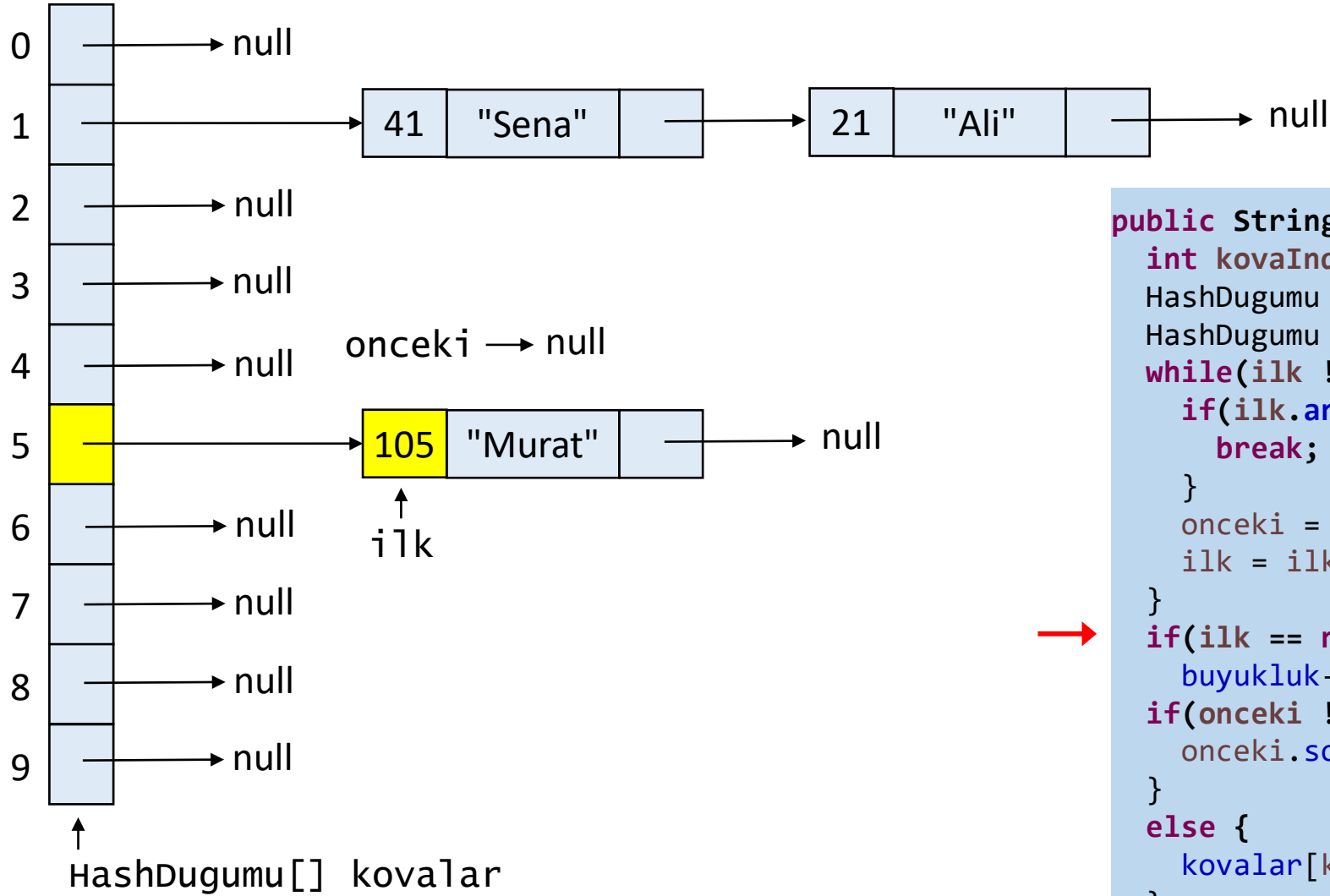
kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(105);



kovaSayisi = 10
 buyukluk = 3
 anahtar = 105
 kovaIndeksi = 5

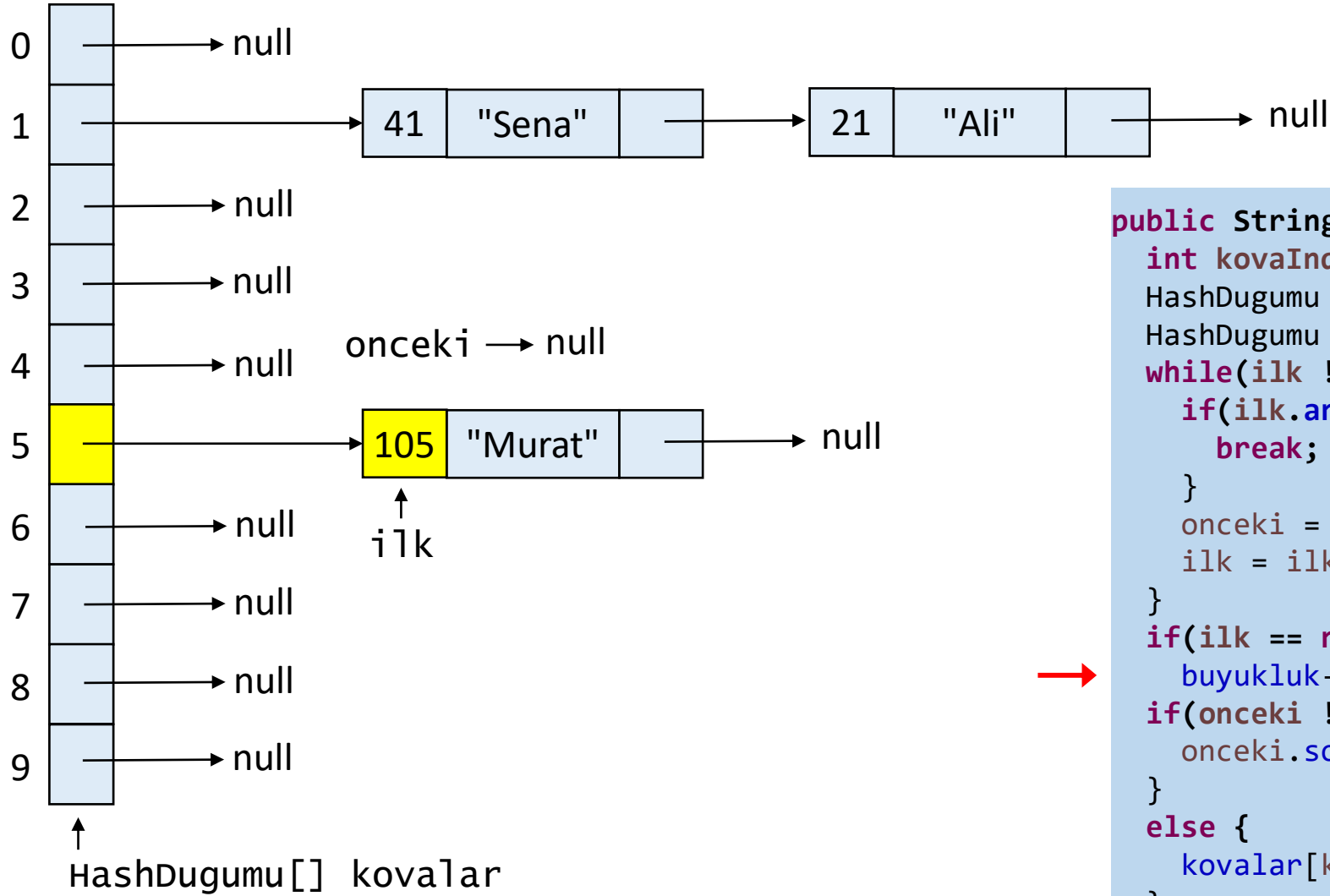
```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```



tablo.sil(105);



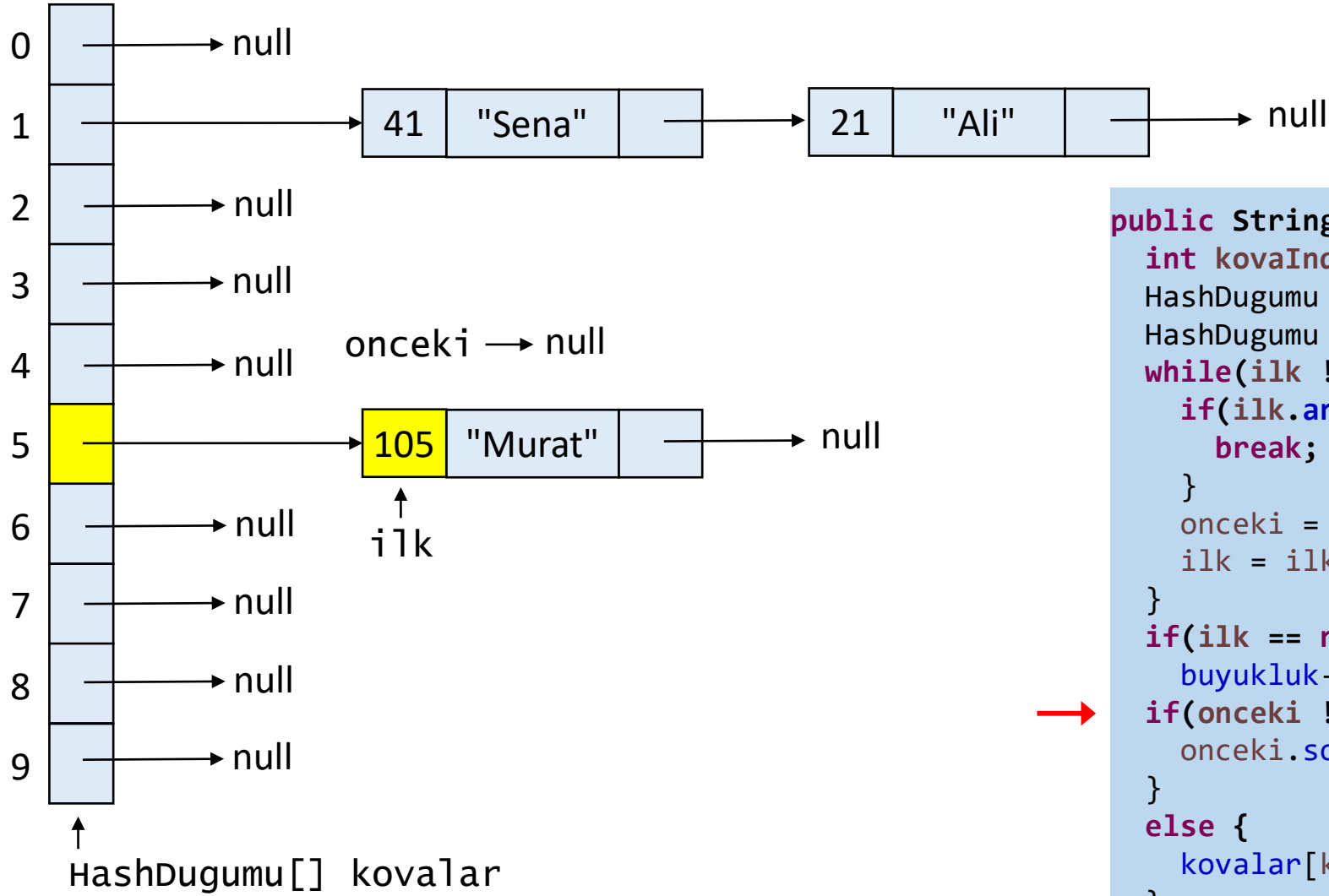
kovaSayisi = 10
 buyukluk = 2
 anahtar = 105
 kovaIndeksi = 5

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(105);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 105
 kovaIndeksi = 5

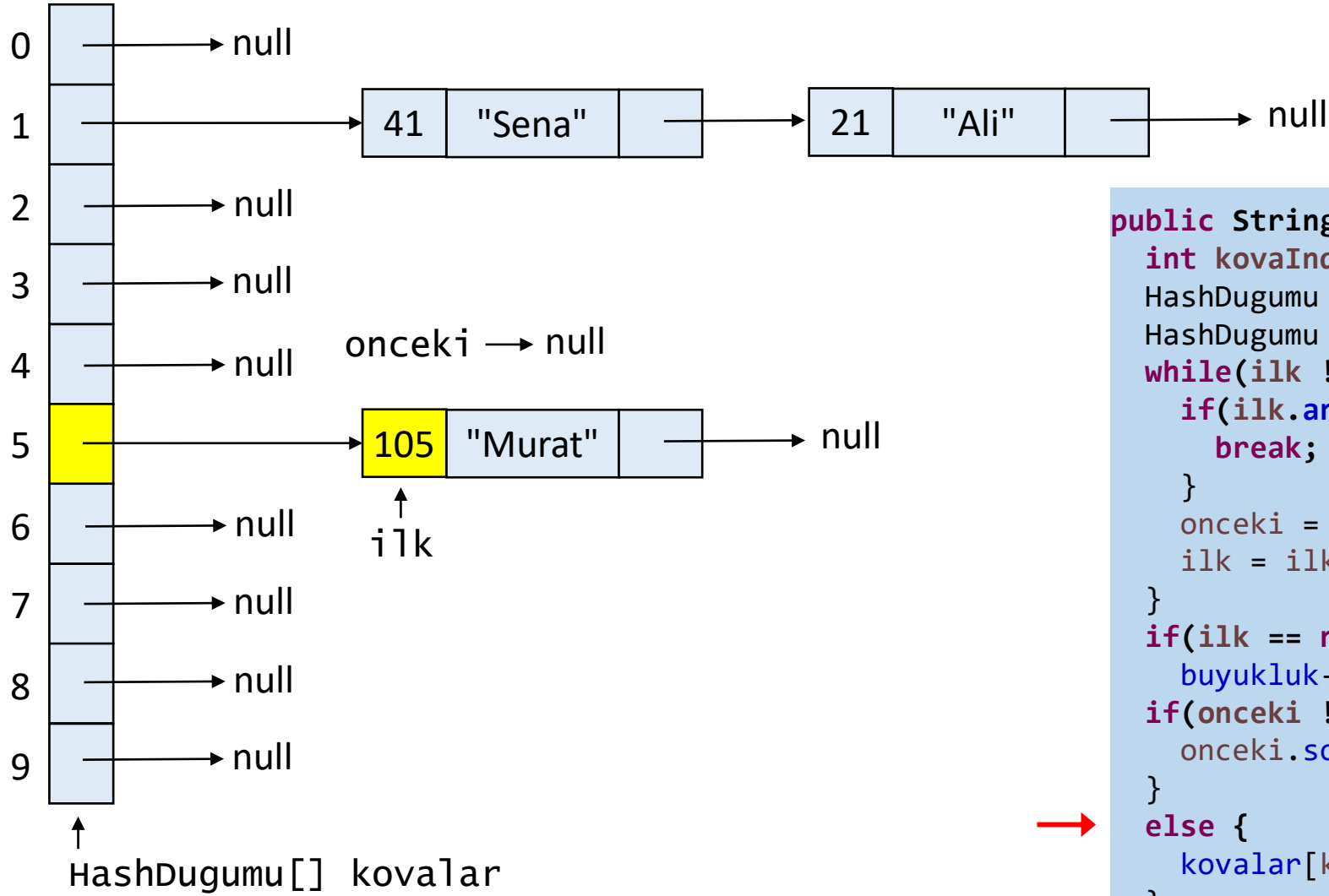
```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```



tablo.sil(105);

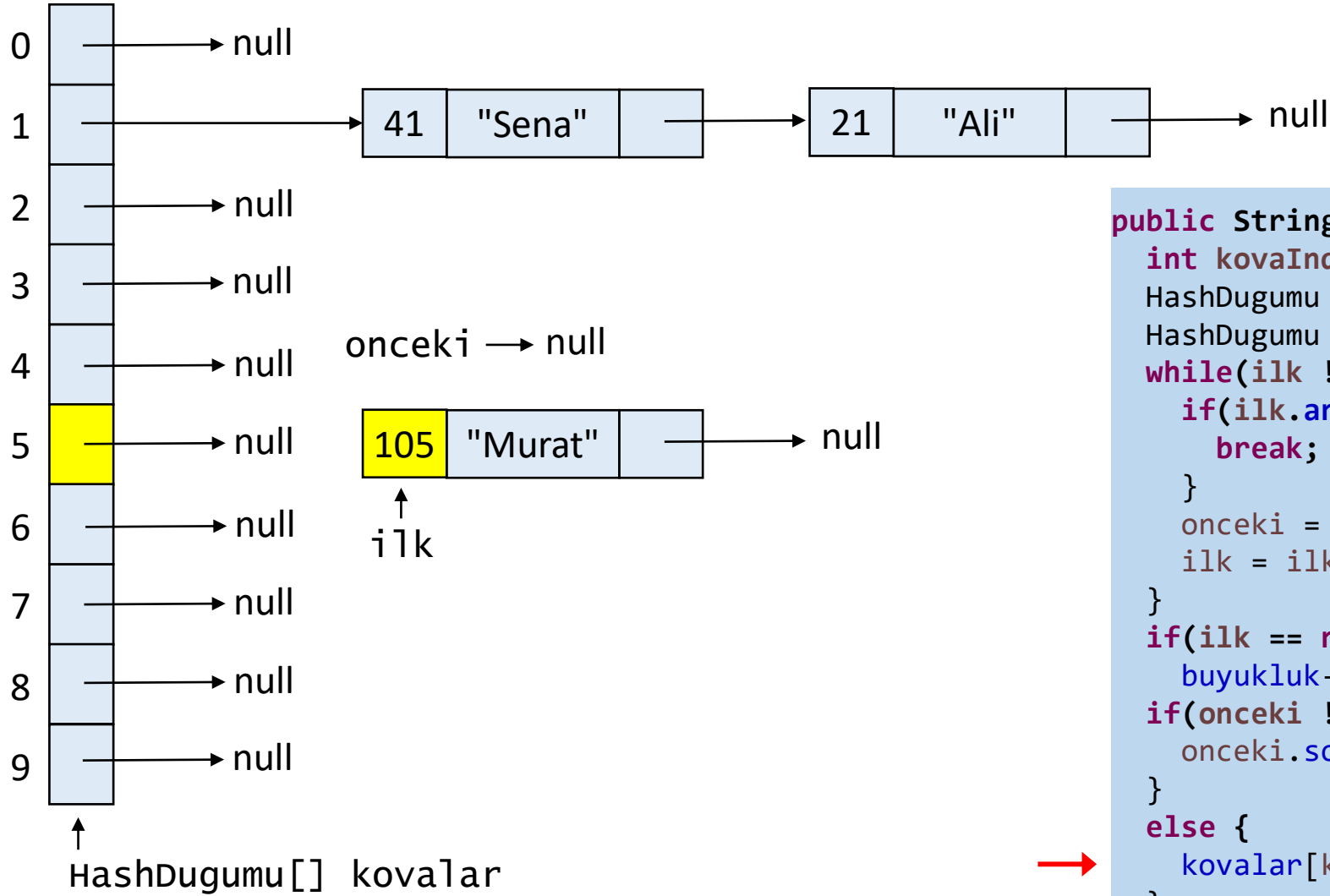


kovaSayisi = 10
 buyukluk = 2
 anahtar = 105
 kovaIndeksi = 5

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```



tablo.sil(105);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 105
 kovaIndeksi = 5

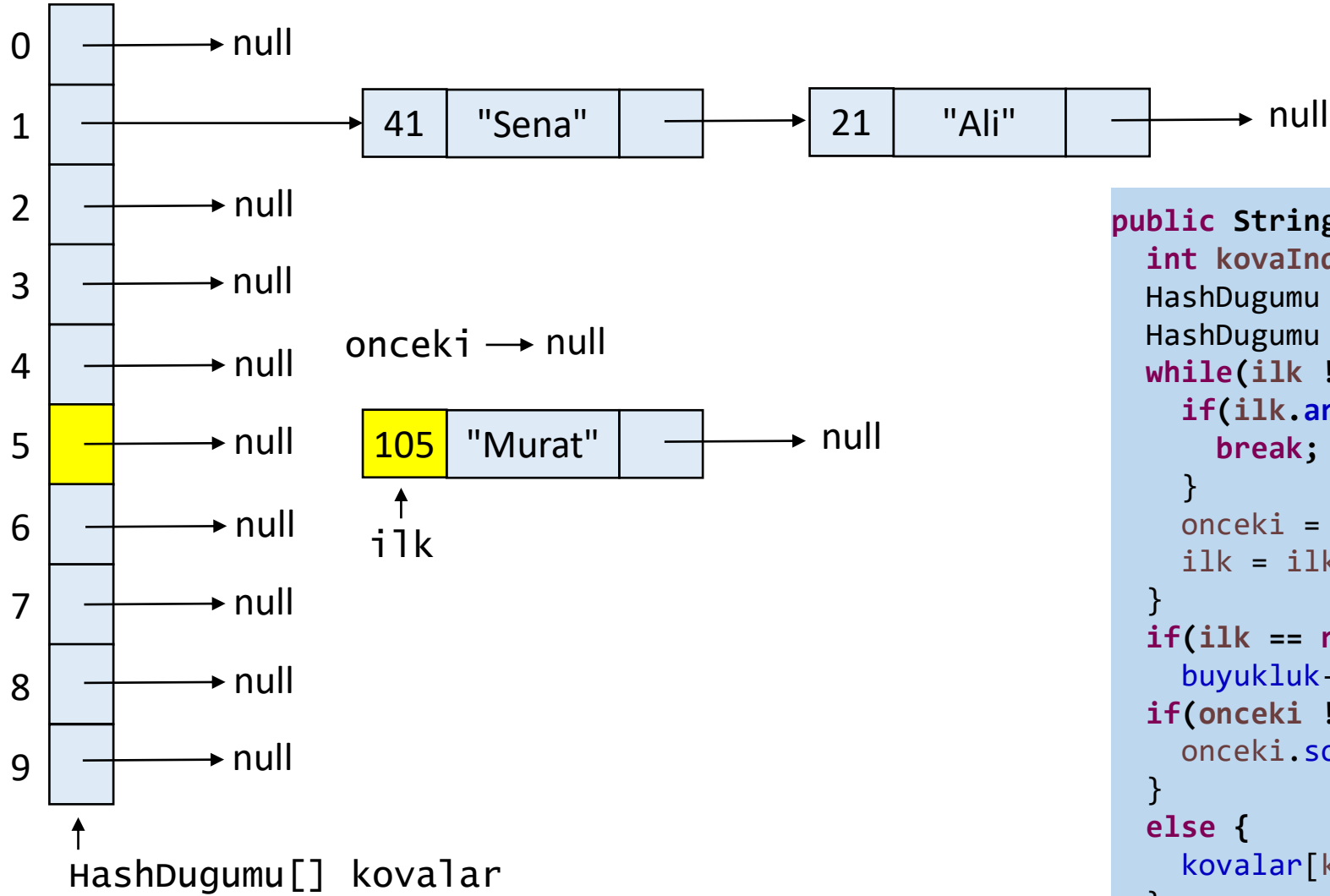
```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```



tablo.sil(105);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 105
 kovaIndeksi = 5

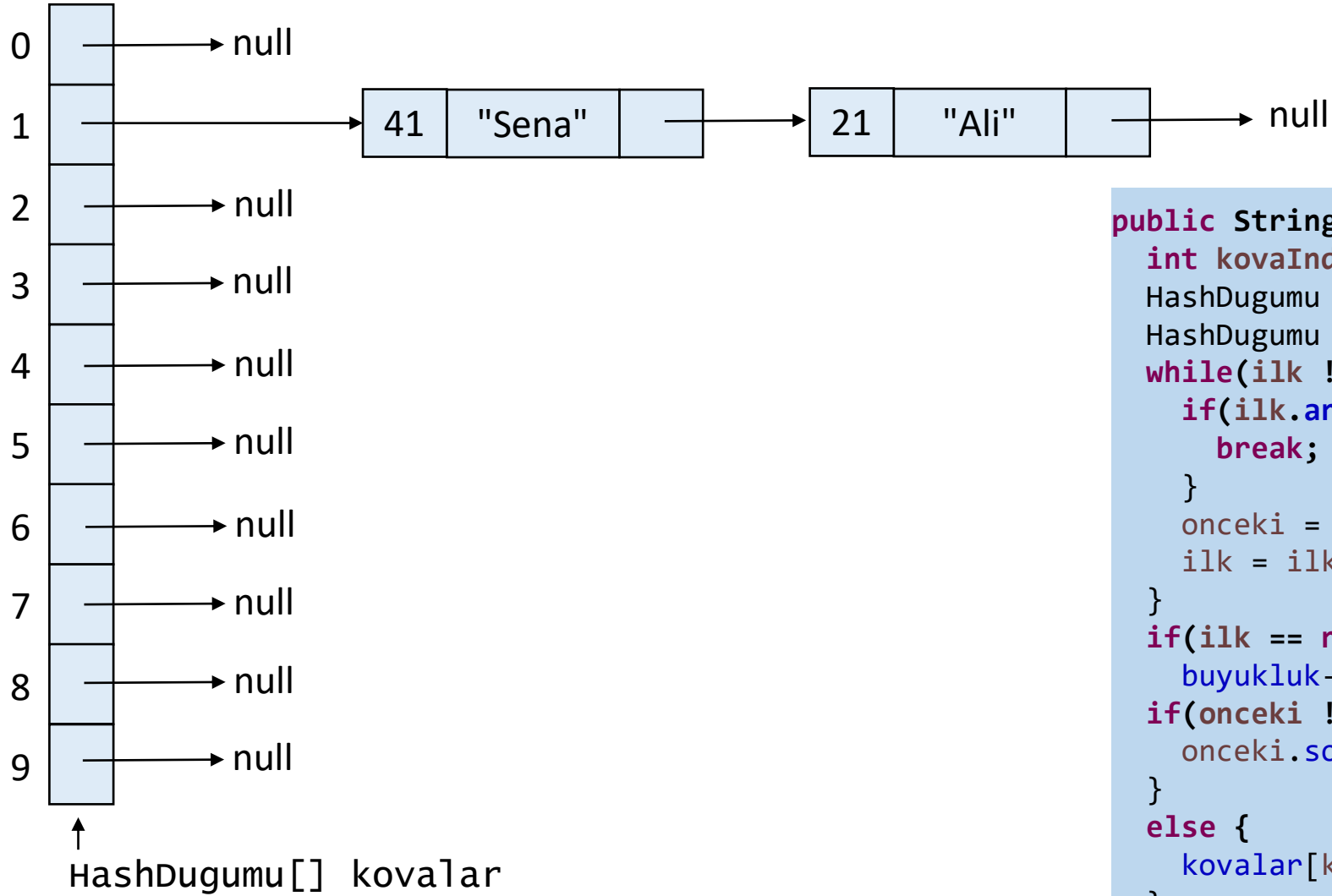
```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```



tablo.sil(105);

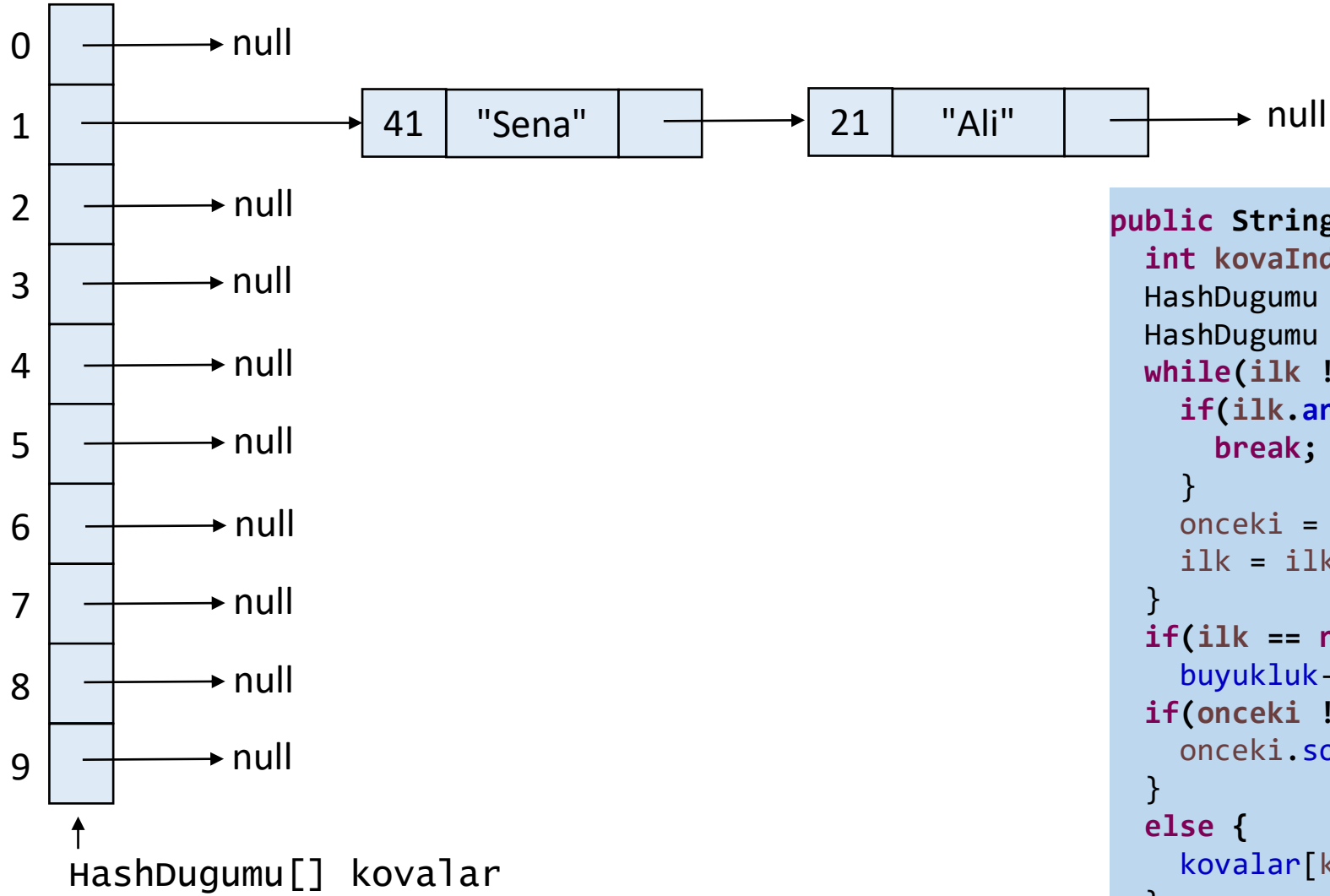


kovaSayisi = 10
buyukluk = 2

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

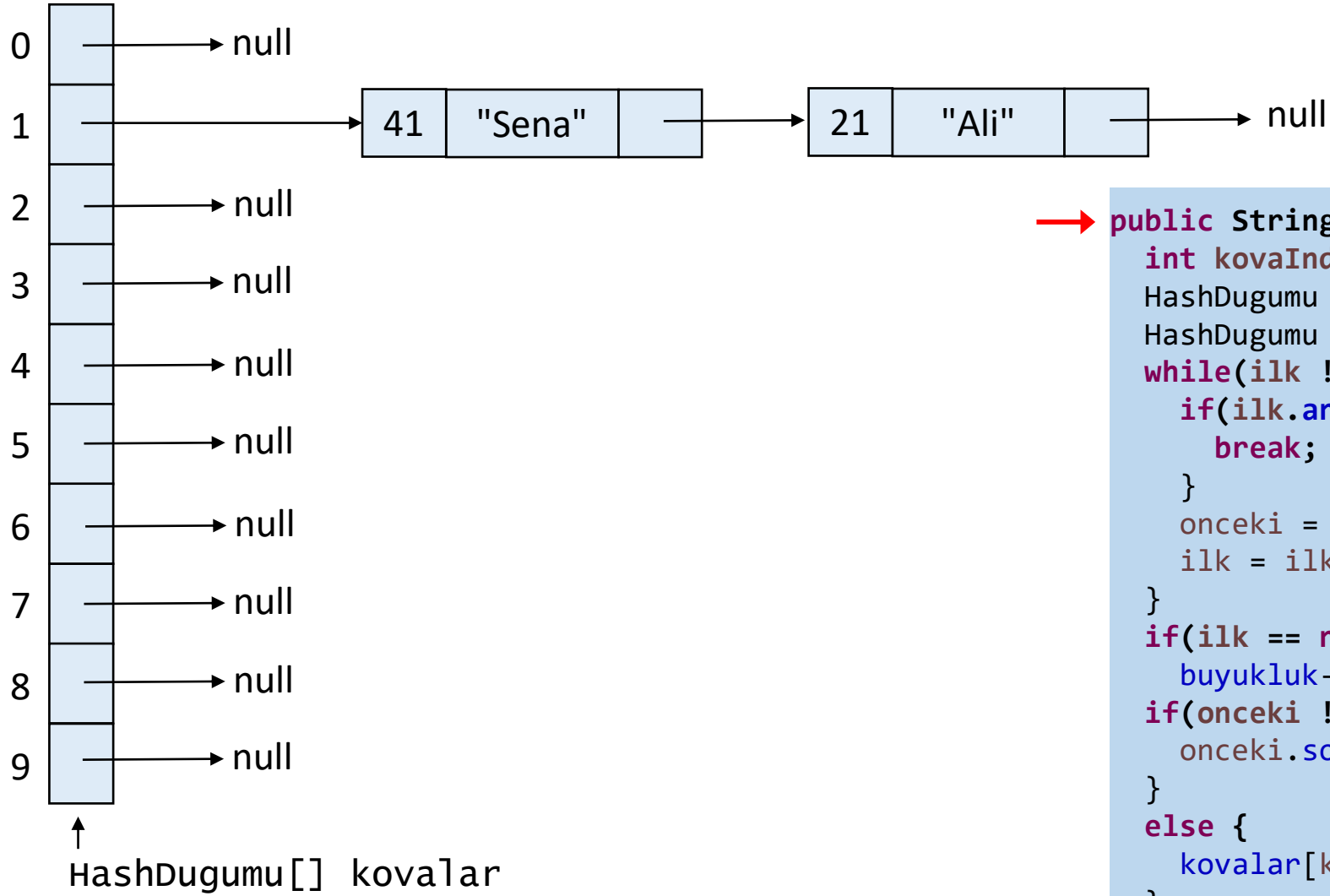
```



kovaSayisi = 10
buyukluk = 2

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

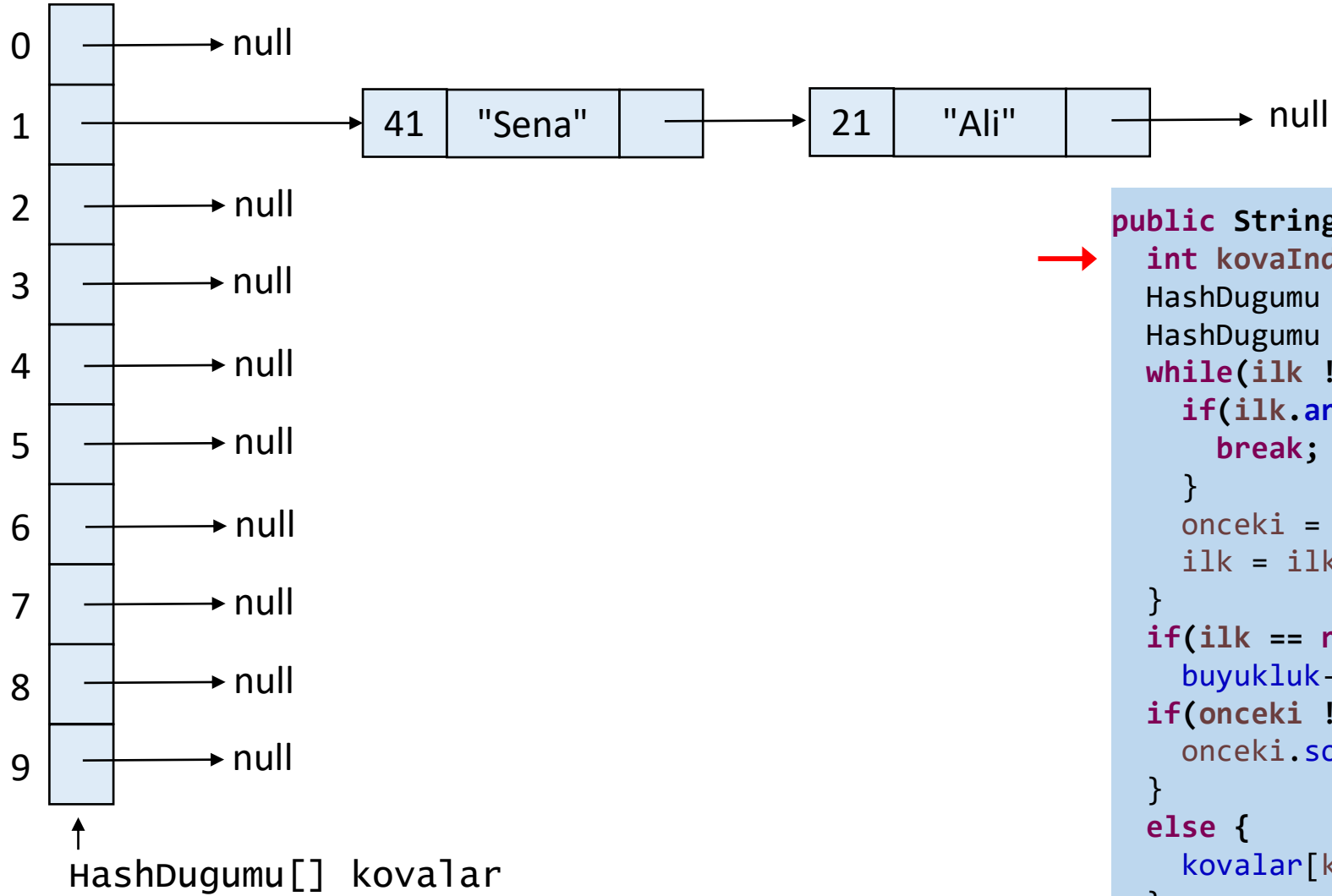
tablo.sil(21);



kovaSayisi = 10
buyukluk = 2
anahtar = 21

```
→ public String sil(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    HashDugumu onceki = null;  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            break;  
        }  
        onceki = ilk;  
        ilk = ilk.sonraki;  
    }  
    if(ilk == null) { return null; }  
    buyukluk--;  
    if(onceki != null) {  
        onceki.sonraki = ilk.sonraki;  
    }  
    else {  
        kovalar[kovaIndeksi] = ilk.sonraki;  
    }  
    return ilk.deger;  
}
```

tablo.sil(21);

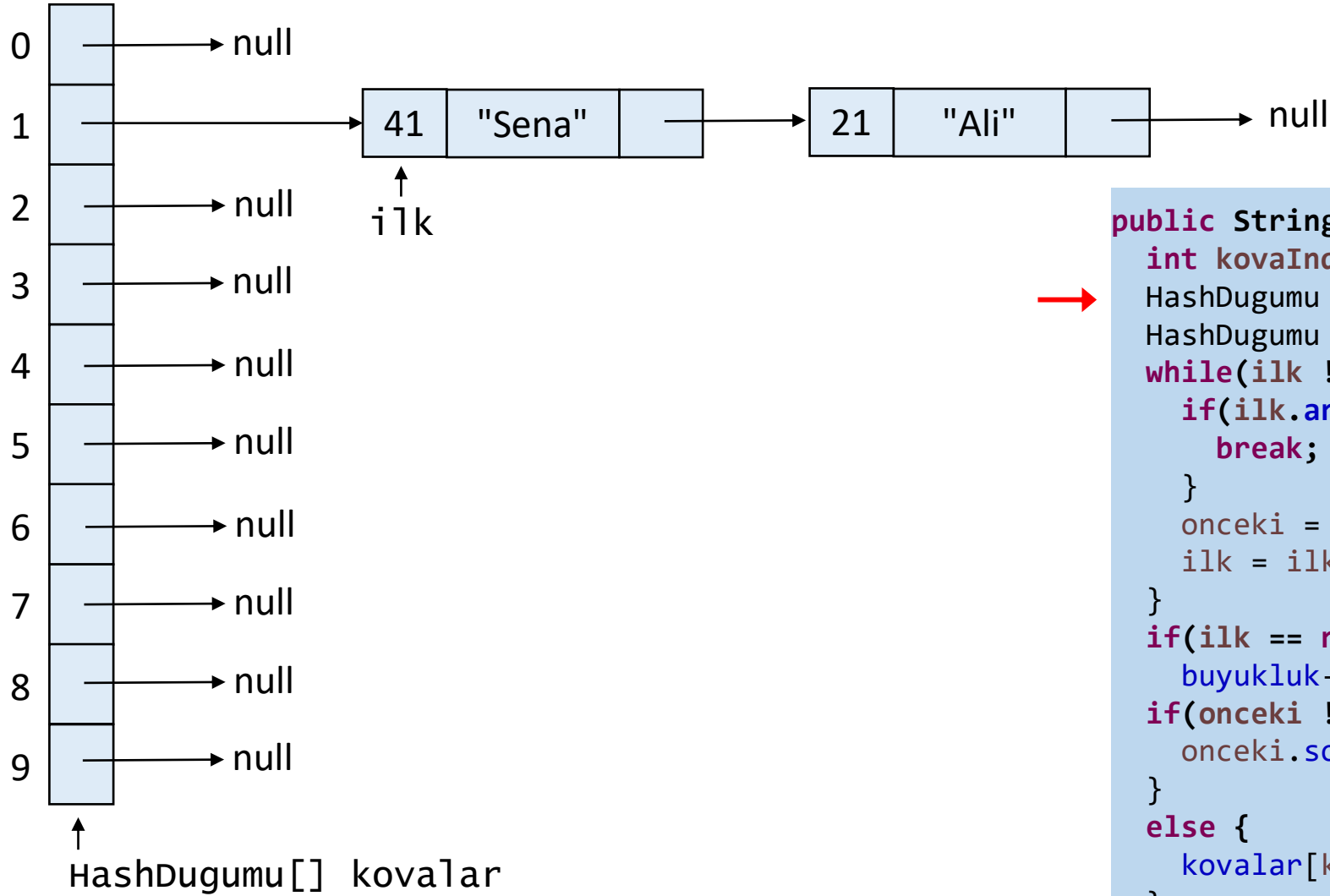


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(21);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1

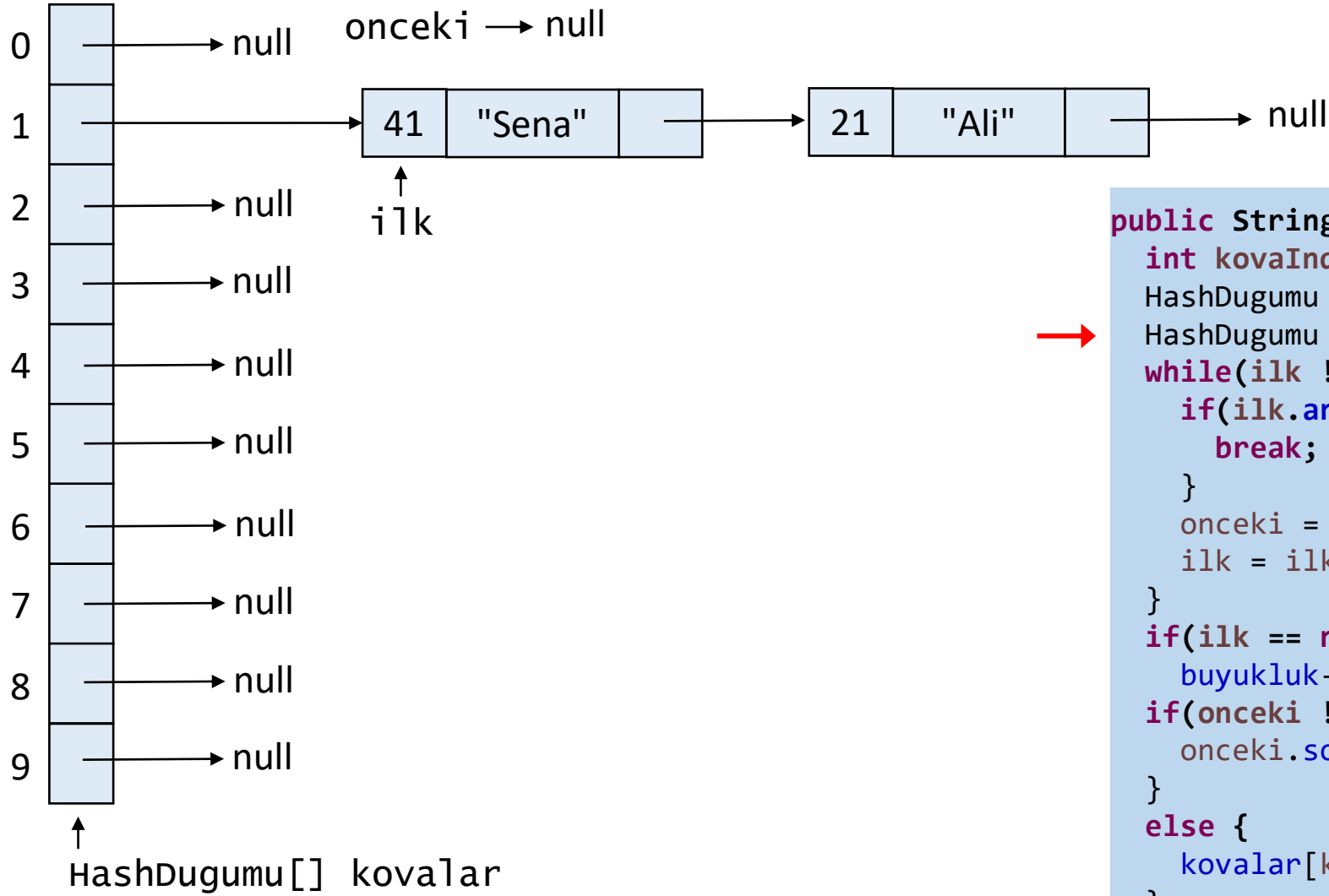


```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(21);

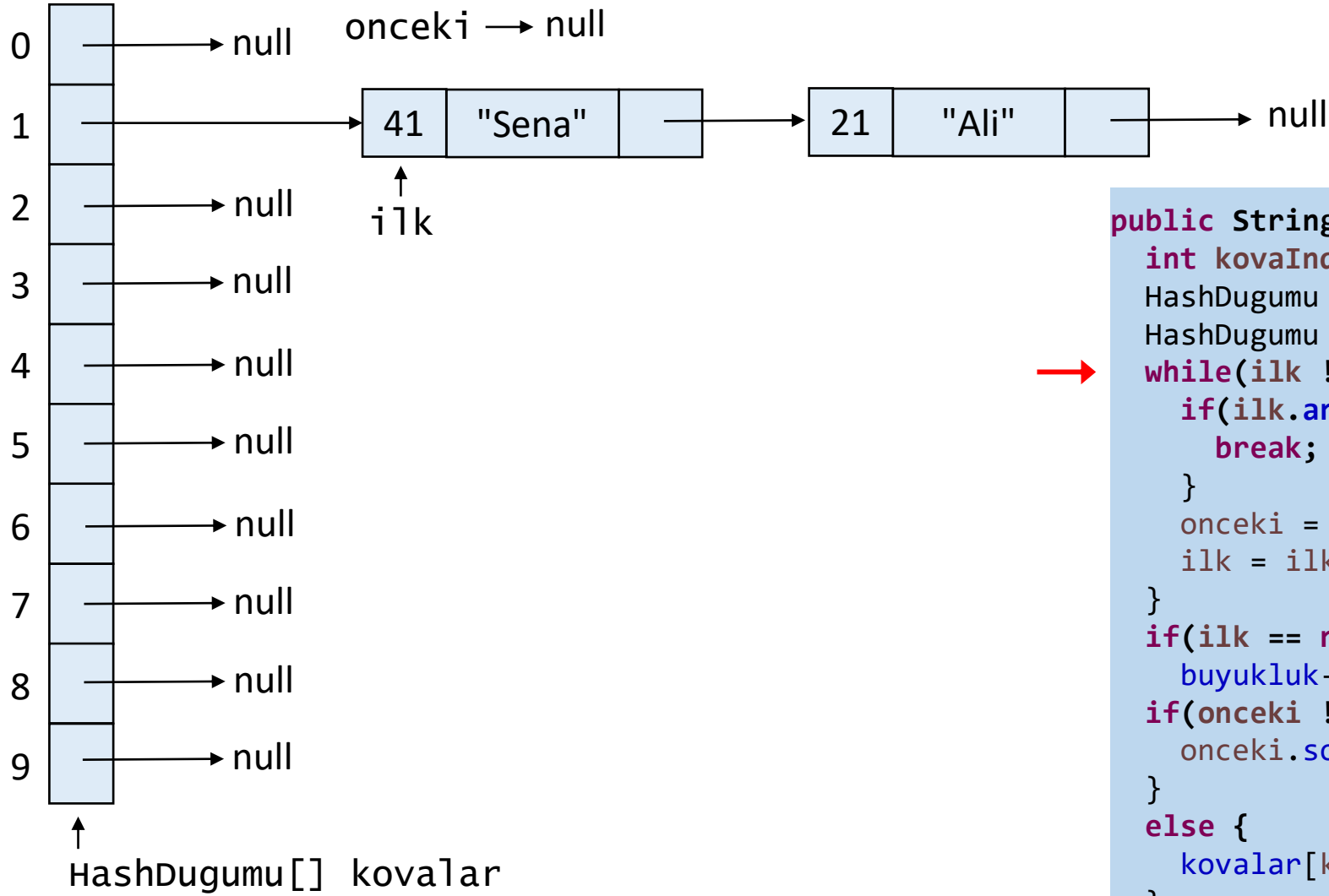


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(21);

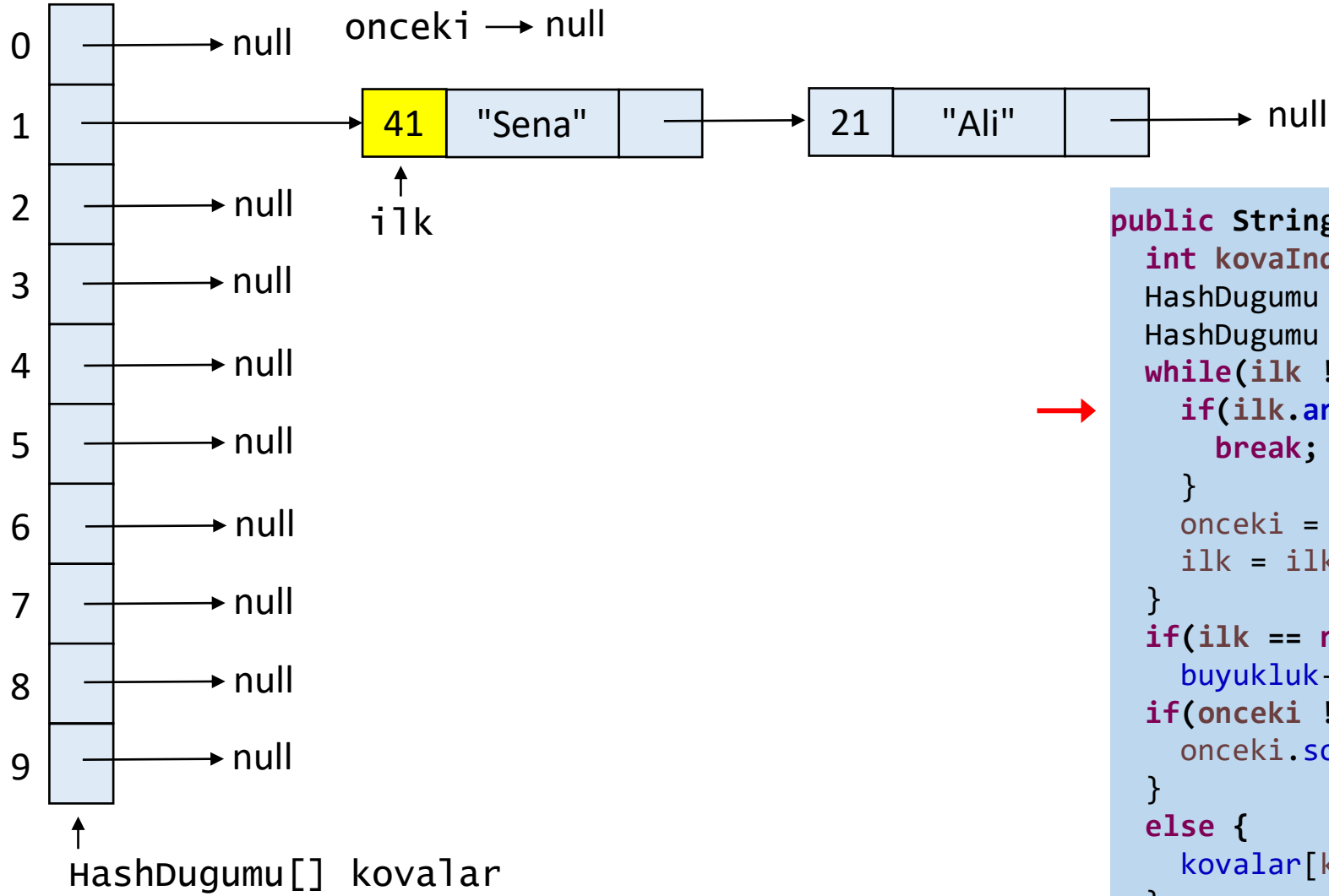


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(21);

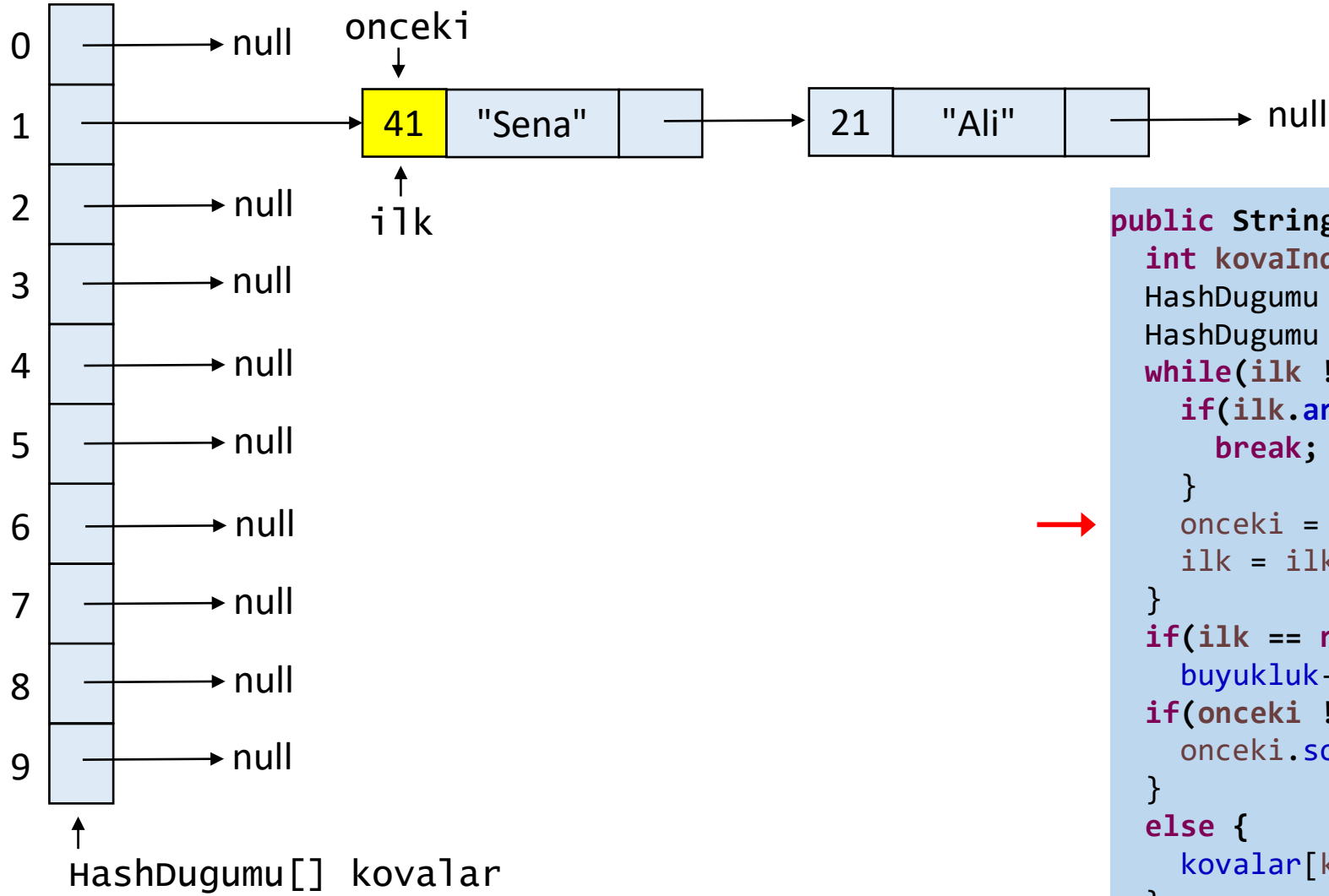


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(21);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1

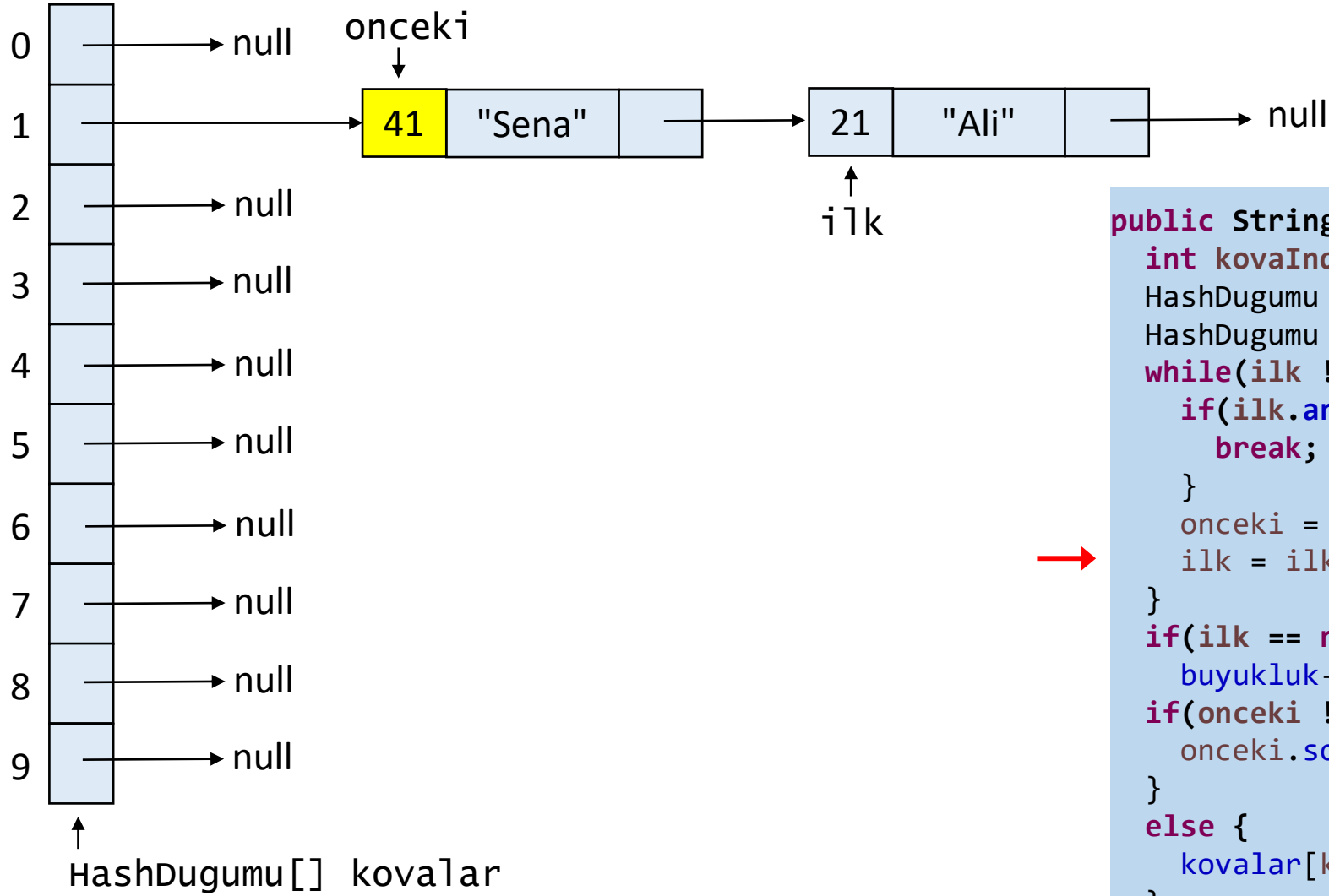
```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```



tablo.sil(21);

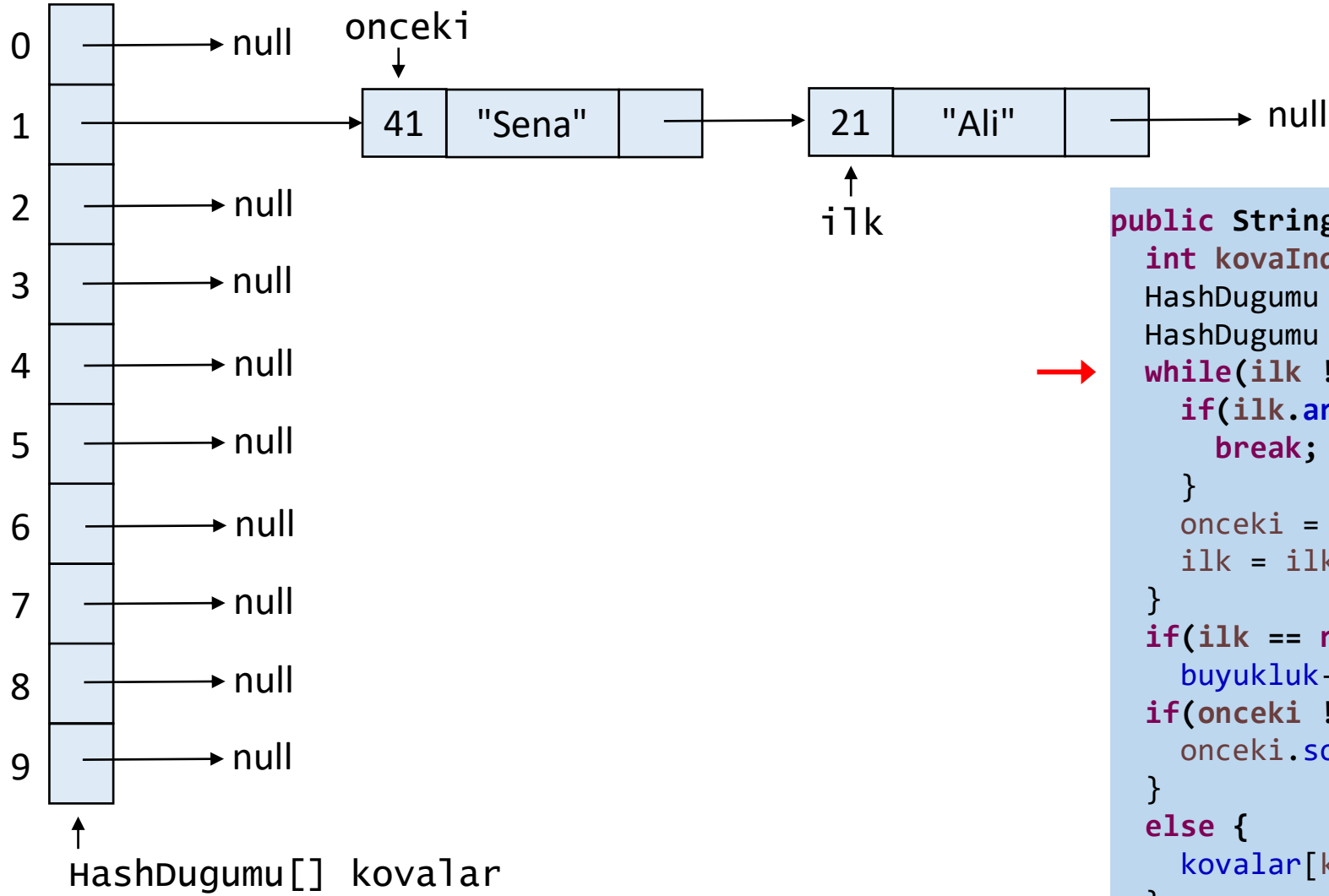


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(21);



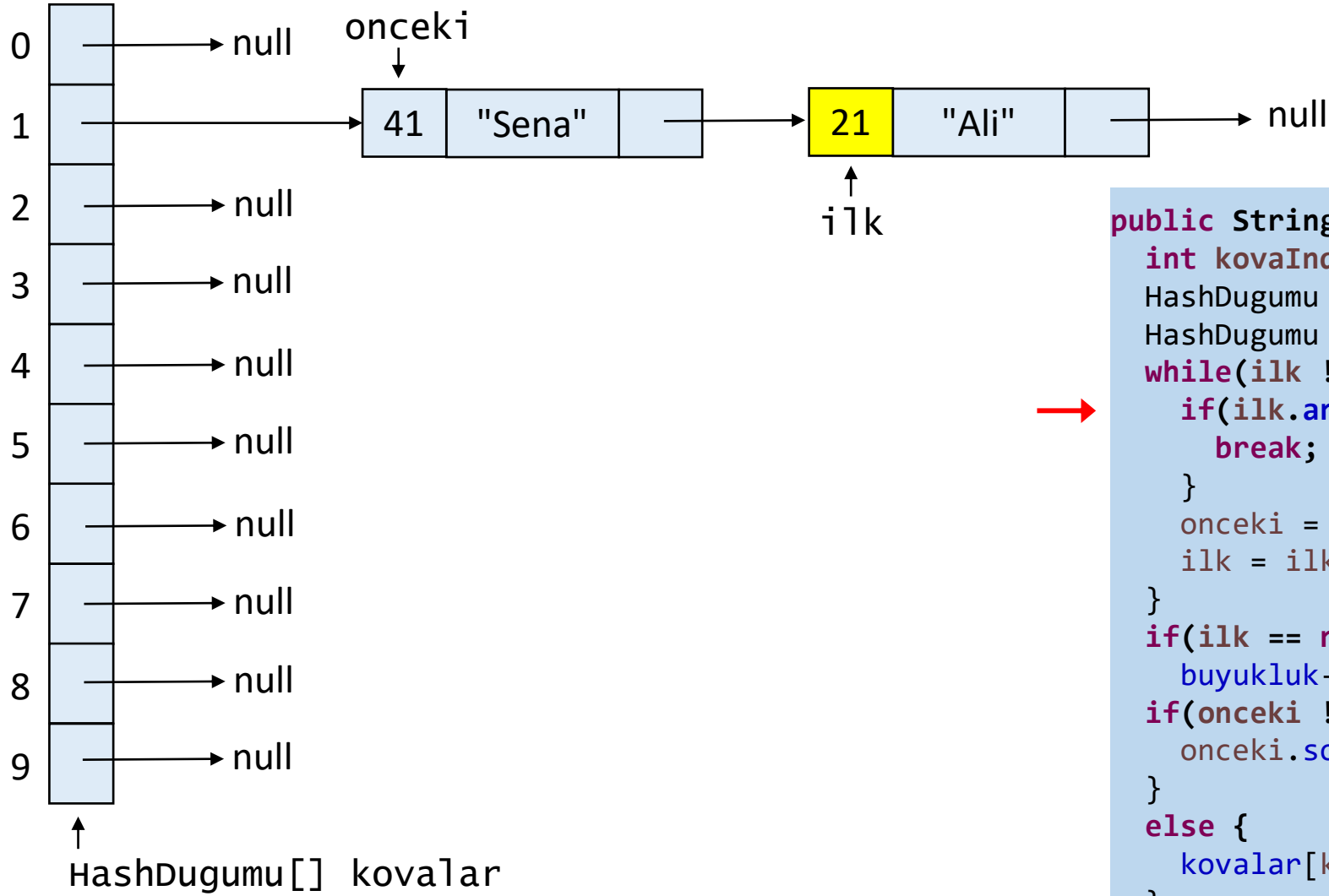
kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(21);

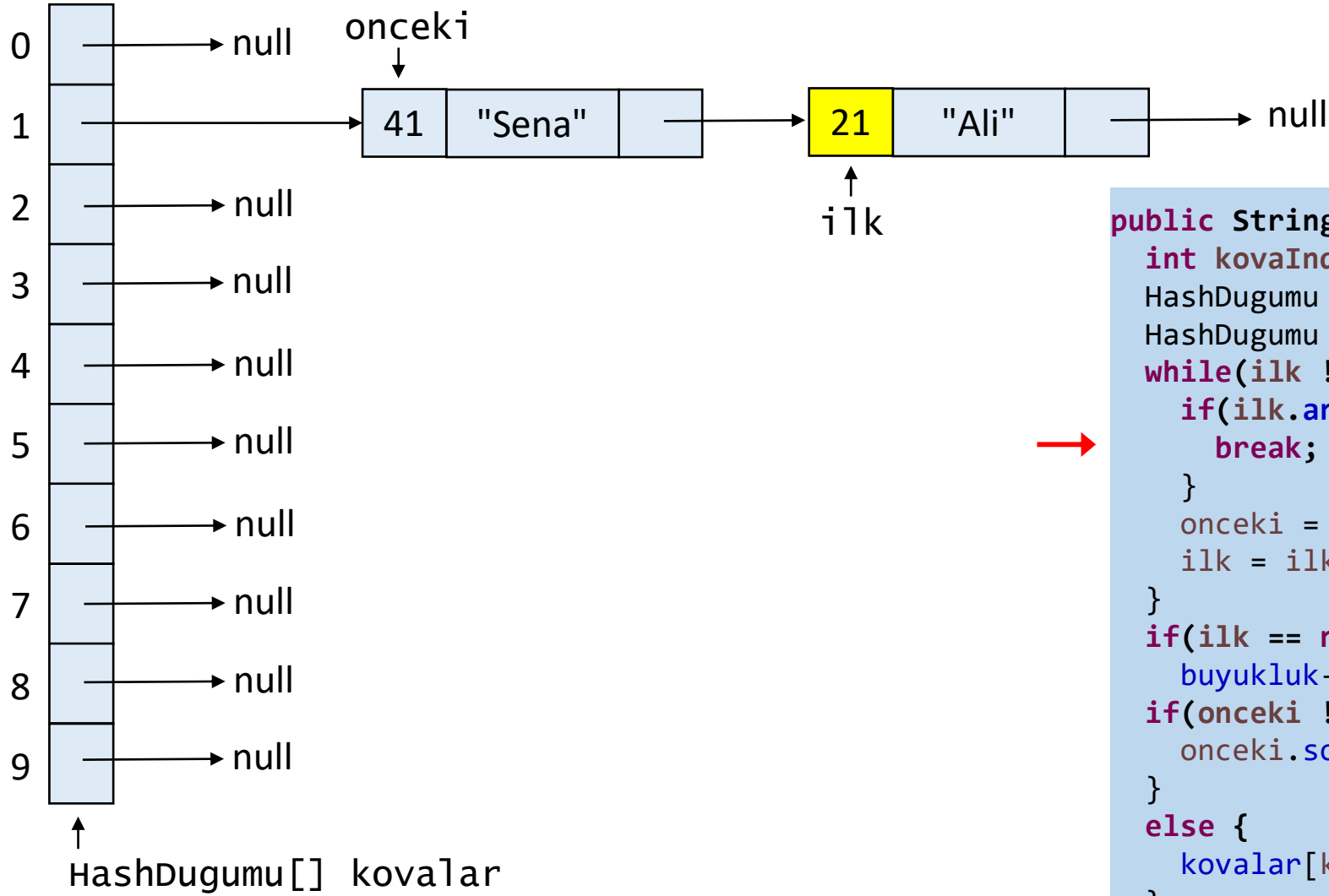


kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

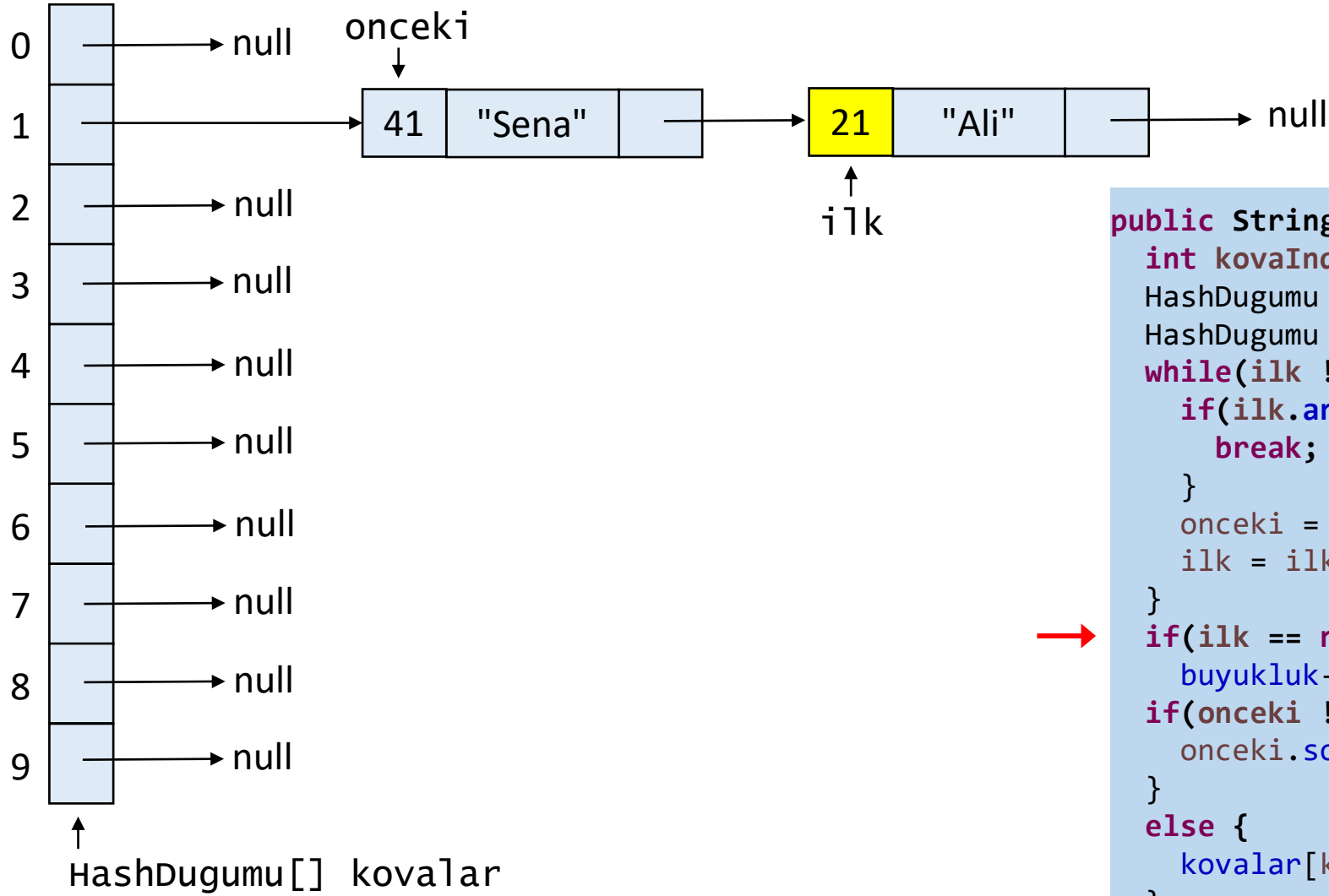
tablo.sil(21);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(21);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 21
 kovaIndeksi = 1

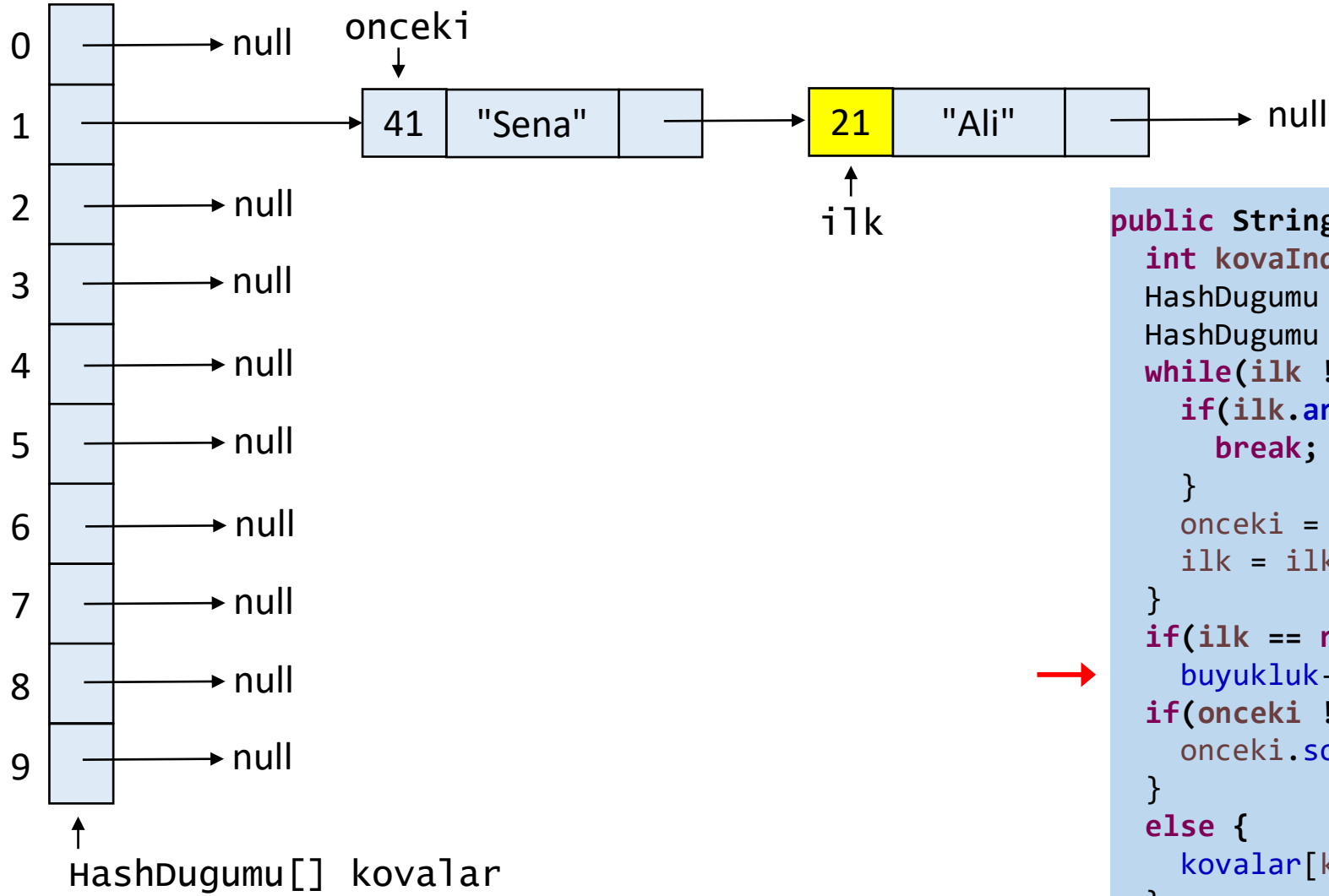
```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```



tablo.sil(21);

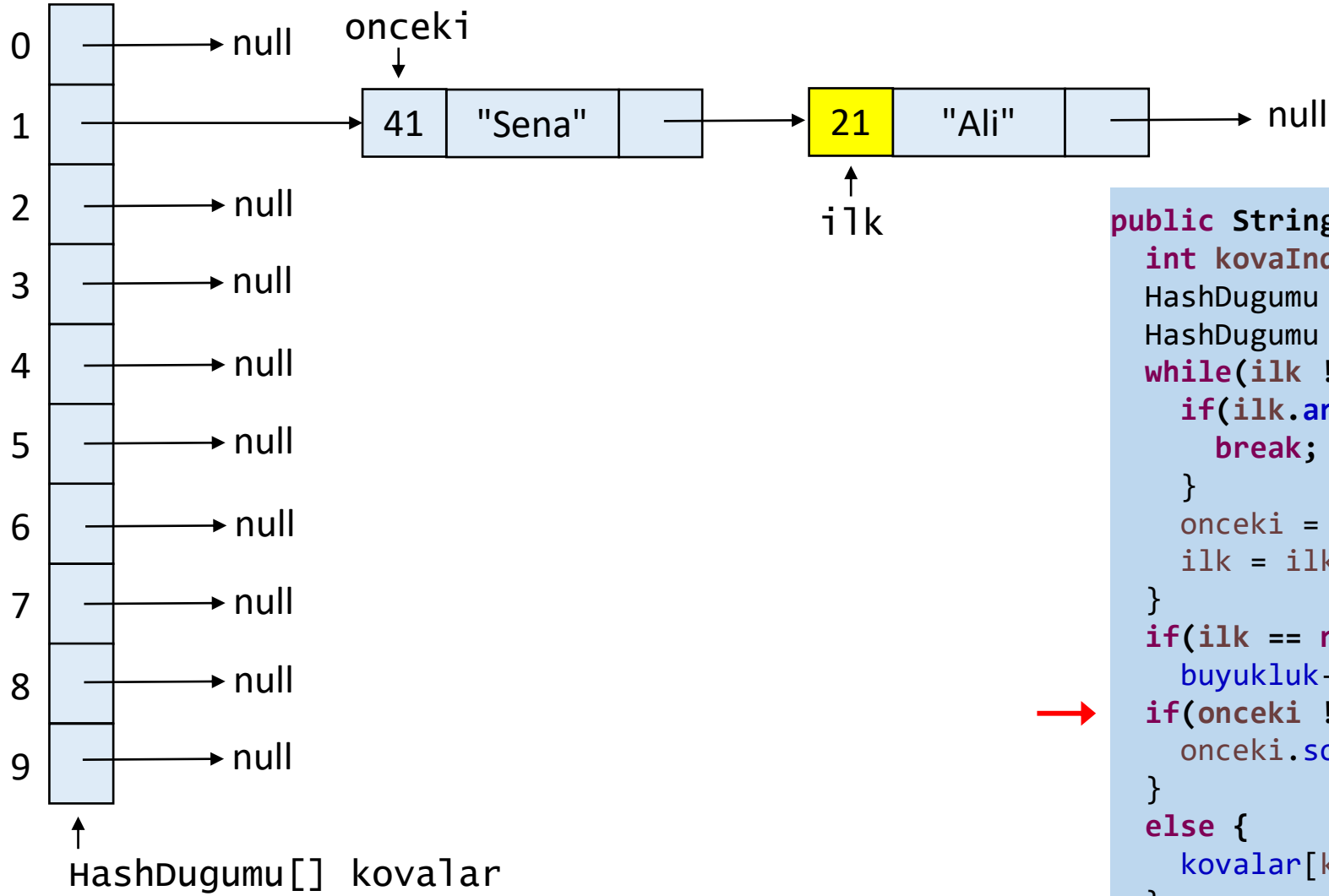


kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 kovaIndeksi = 1

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```



tablo.sil(21);

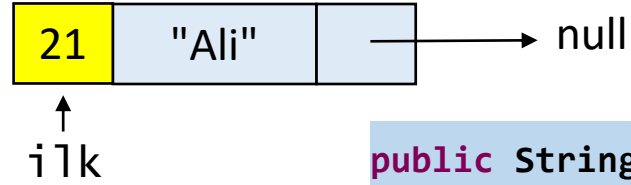
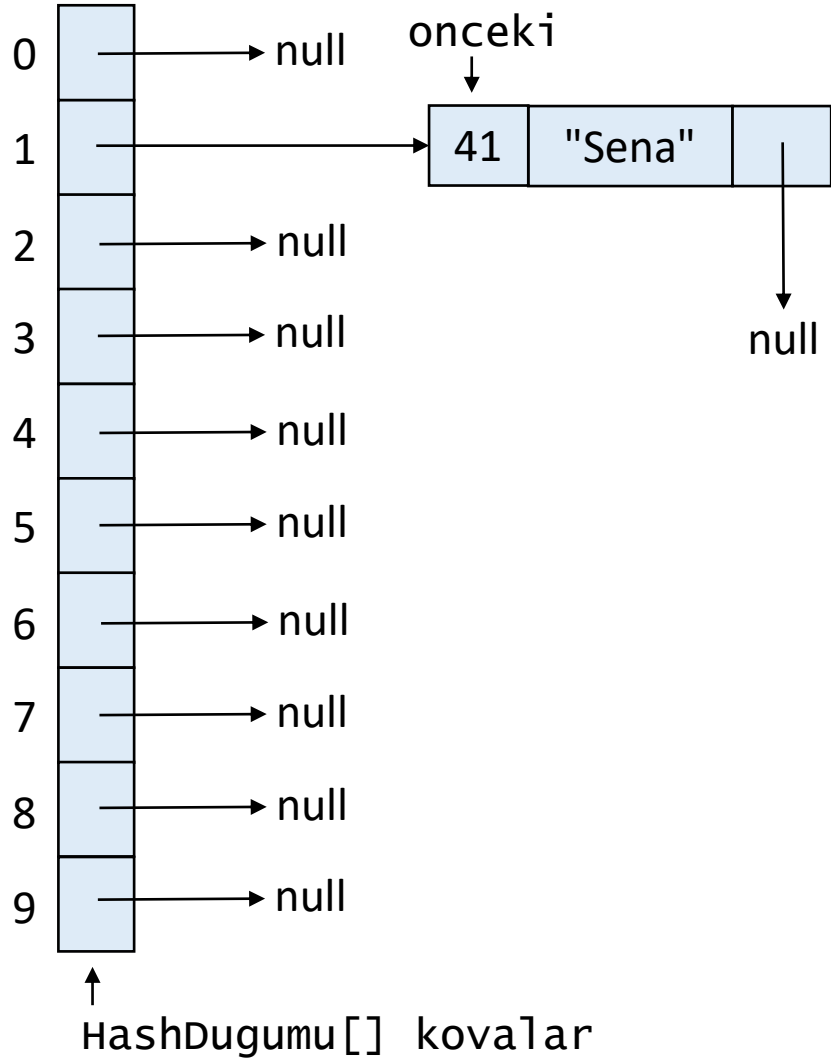


kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 kovaIndeksi = 1

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```



tablo.sil(21);

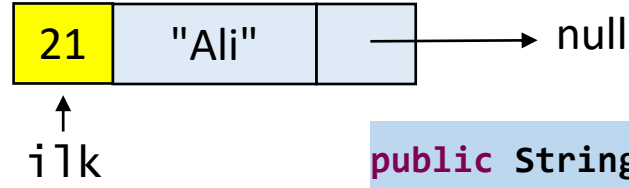
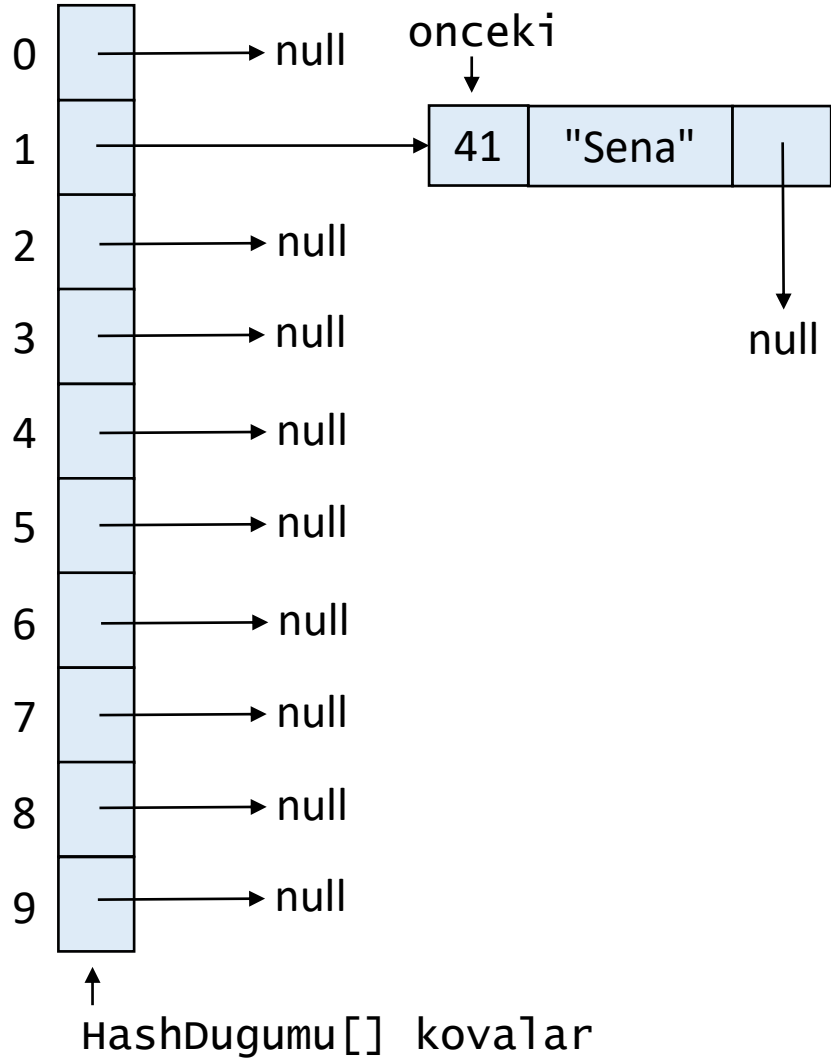


kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 kovaIndeksi = 1

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```



tablo.sil(21);

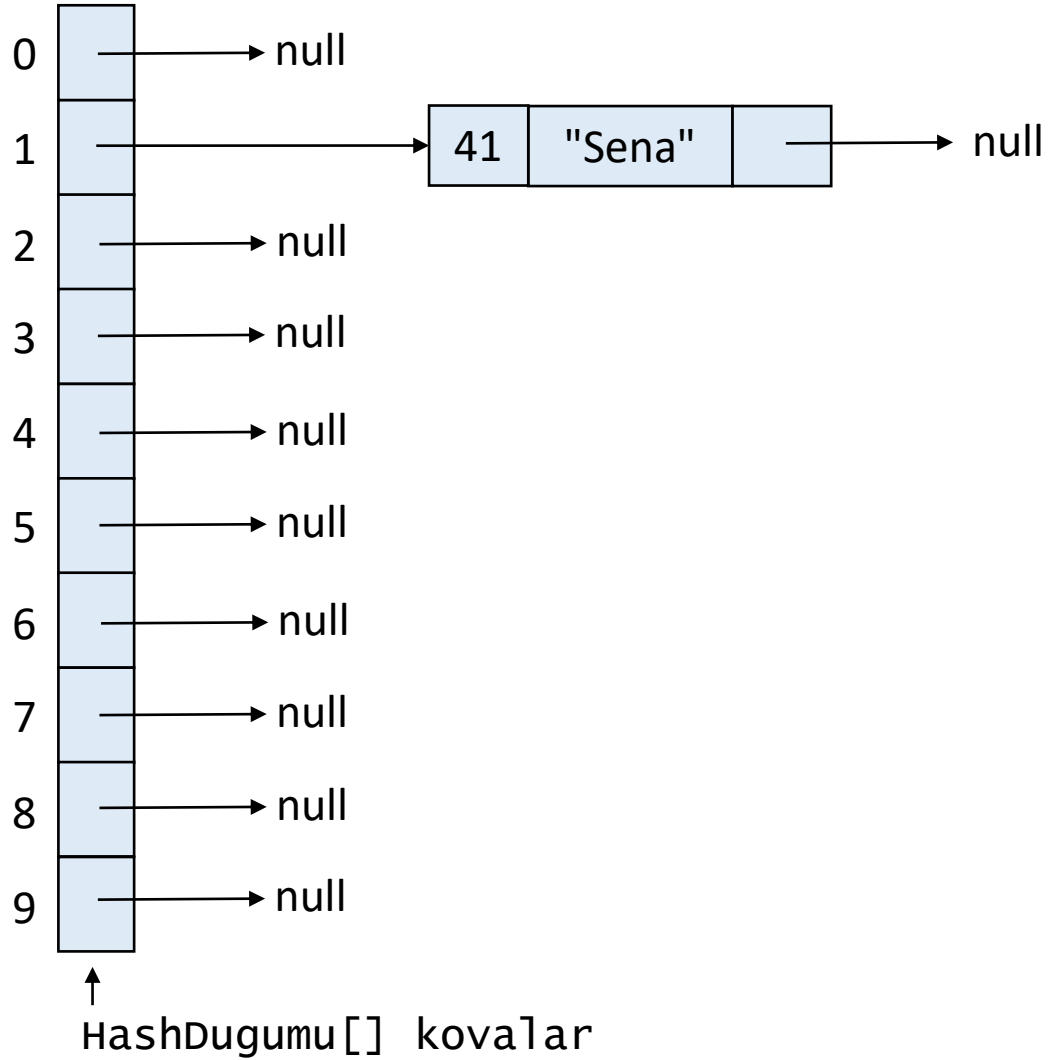


kovaSayisi = 10
 buyukluk = 1
 anahtar = 21
 kovaIndeksi = 1

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

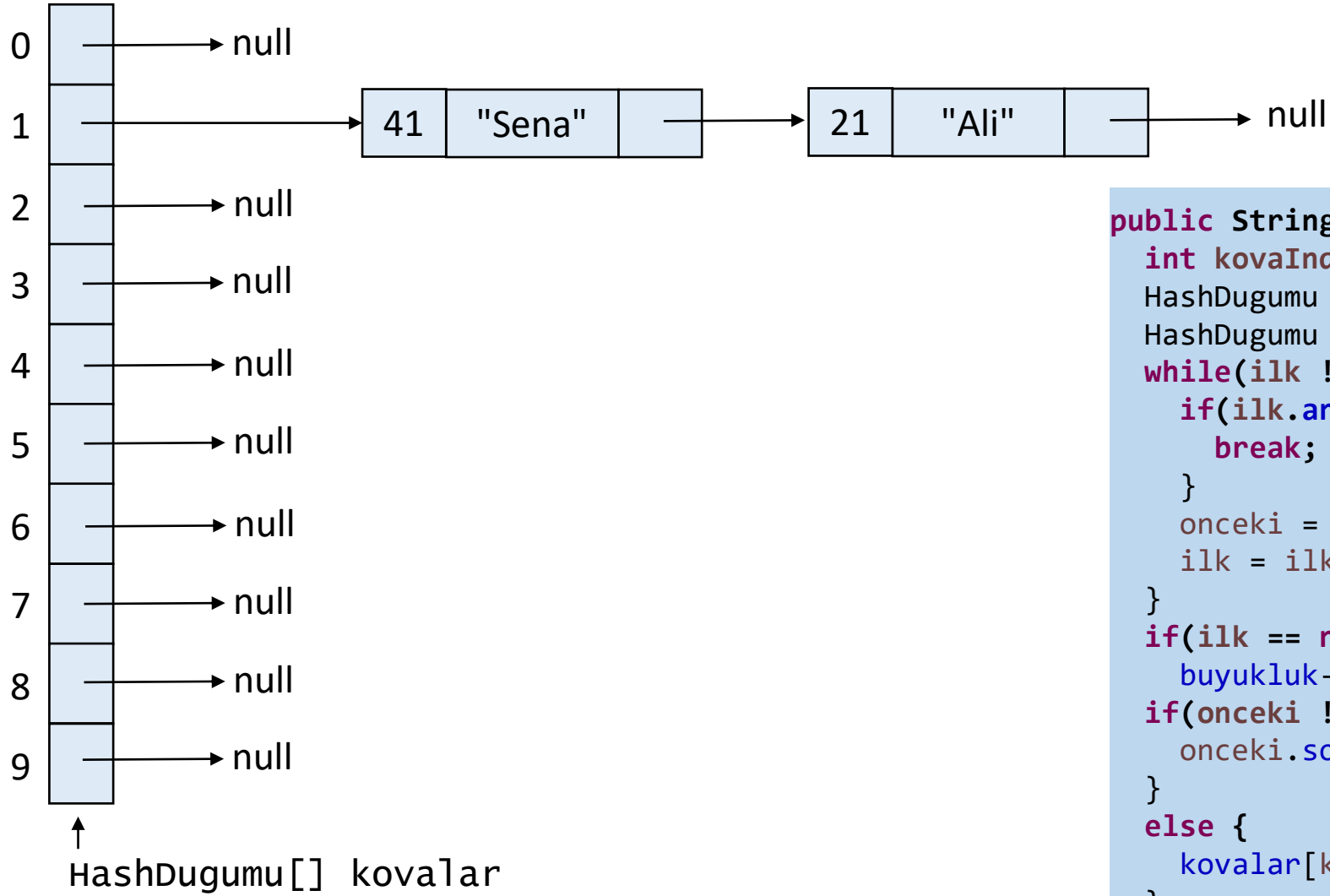


tablo.sil(21);



kovaSayisi = 10
buyukluk = 1

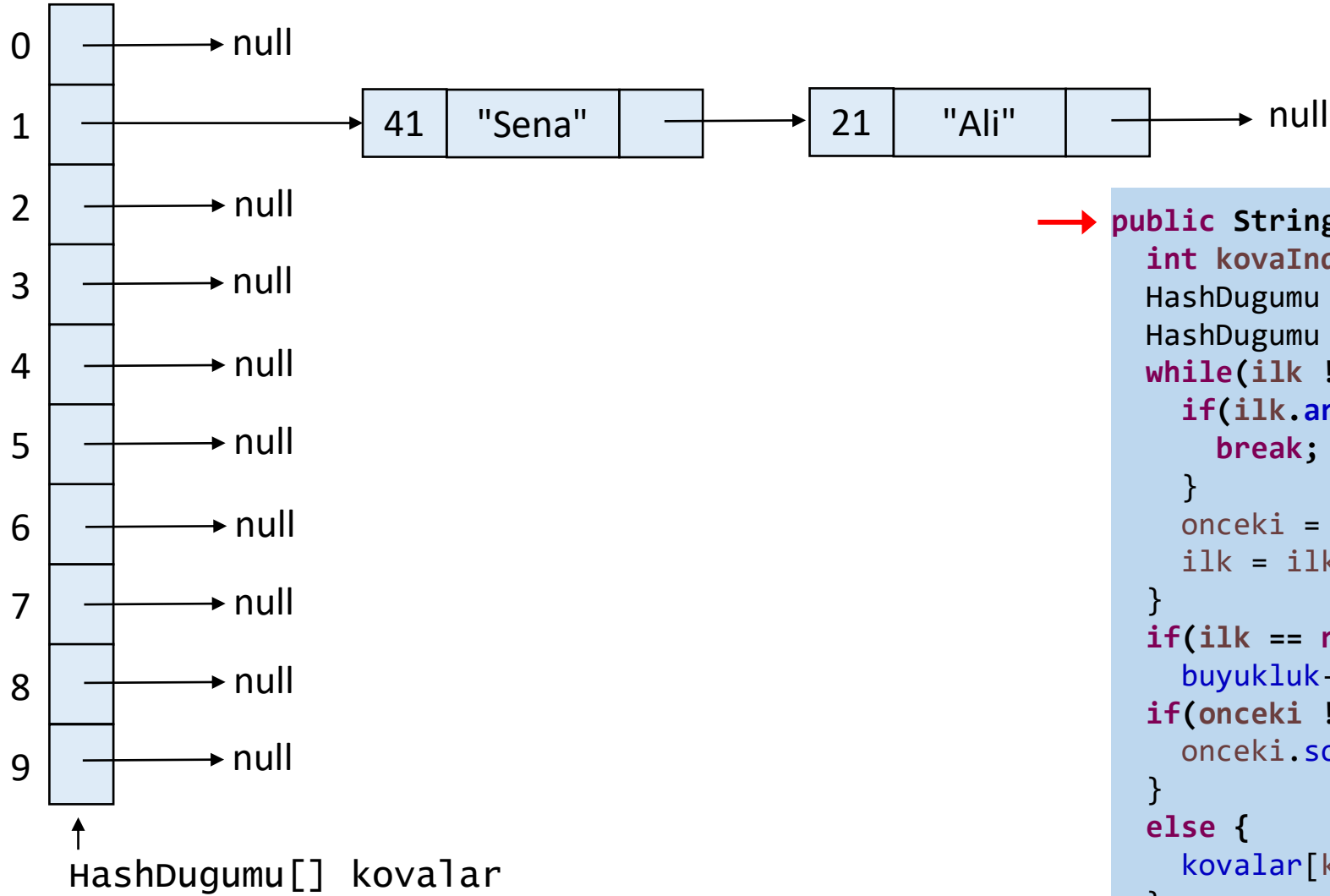
```
public String sil(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    HashDugumu onceki = null;  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            break;  
        }  
        onceki = ilk;  
        ilk = ilk.sonraki;  
    }  
    if(ilk == null) { return null; }  
    buyukluk--;  
    if(onceki != null) {  
        onceki.sonraki = ilk.sonraki;  
    }  
    else {  
        kovalar[kovaIndeksi] = ilk.sonraki;  
    }  
    return ilk.deger;  
}
```

kovaSayisi = 10
 buyukluk = 2

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(41);



kovaSayisi = 10
 buyukluk = 2
 anahtar = 41

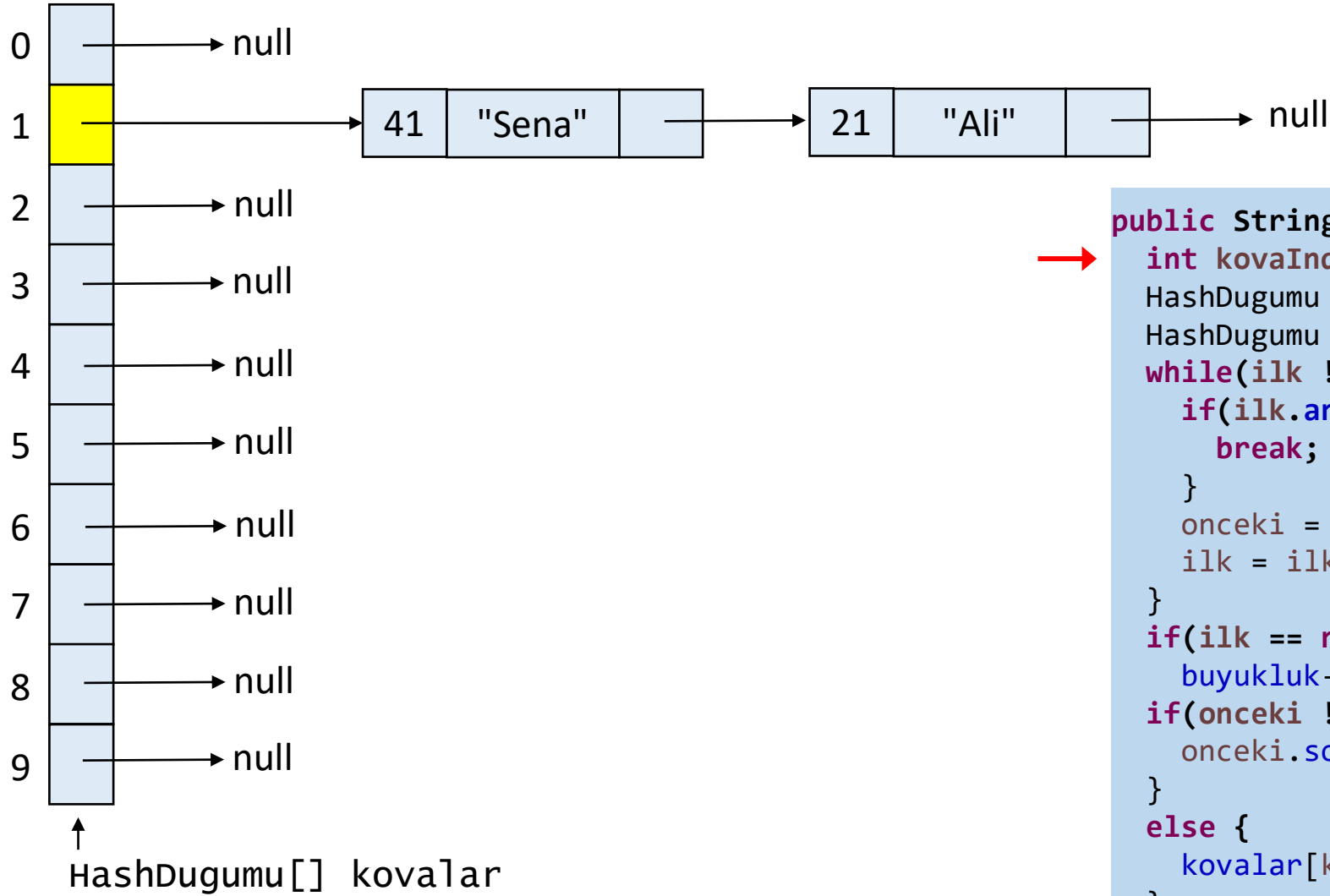


```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(41);



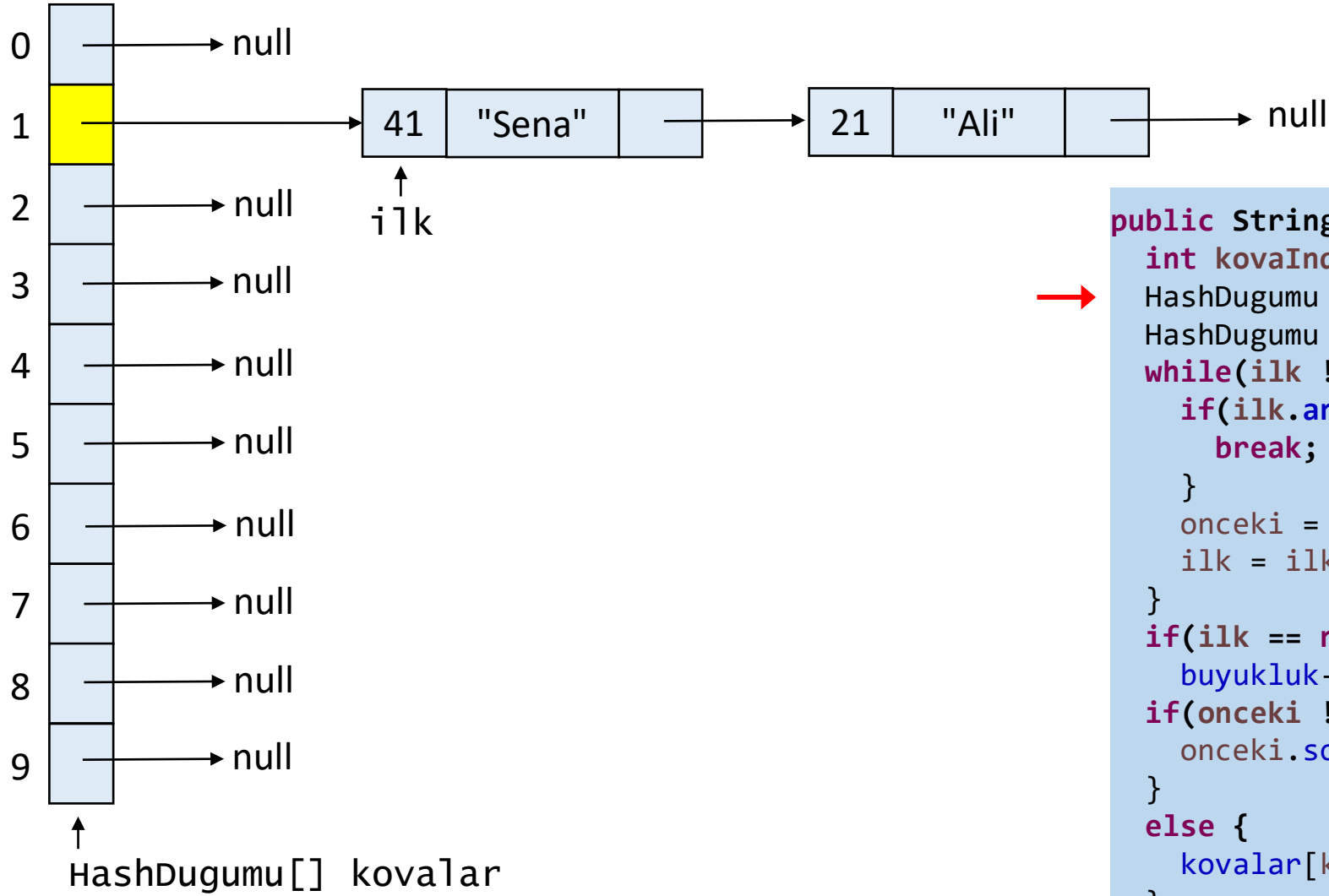
kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(41);

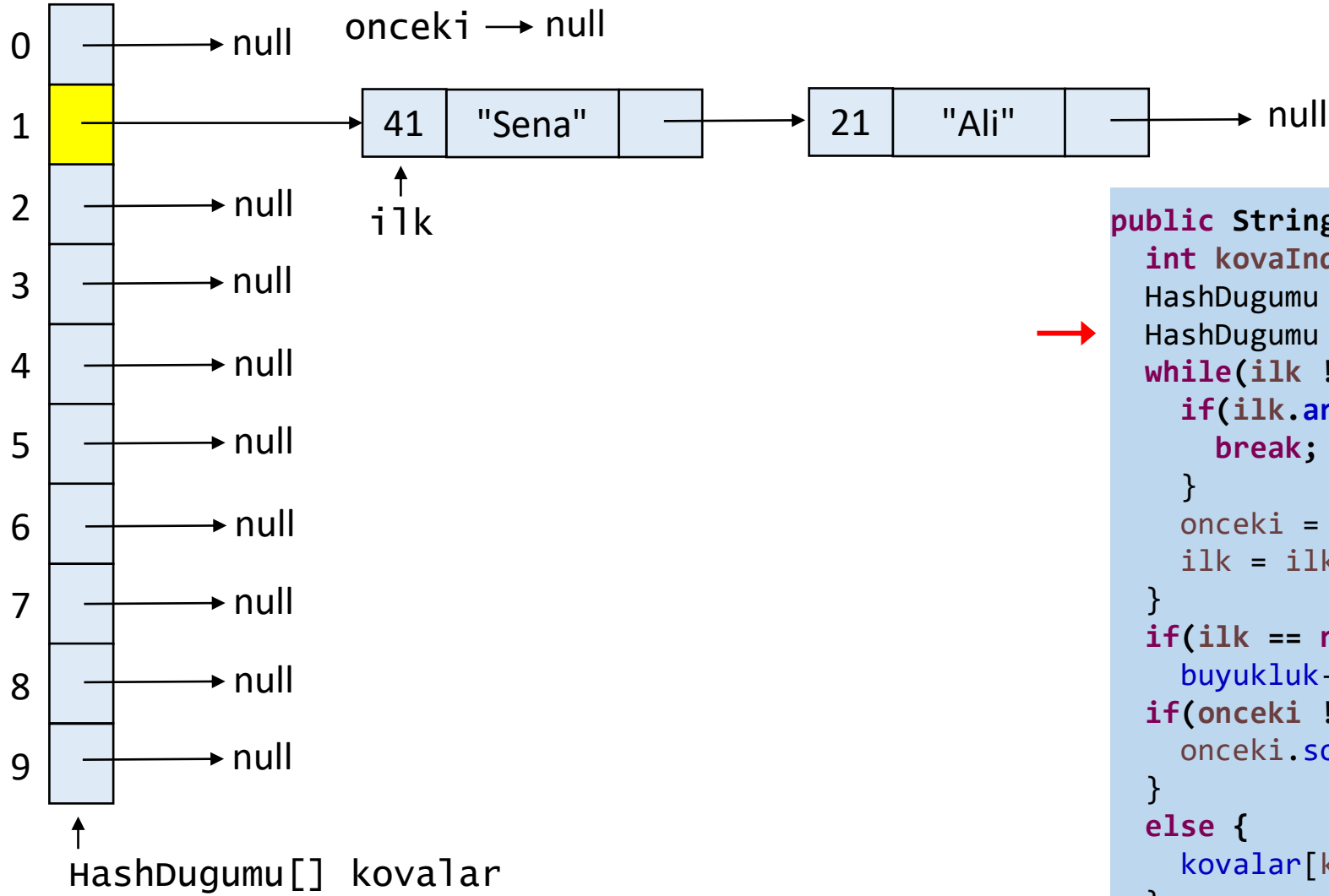


kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(41);

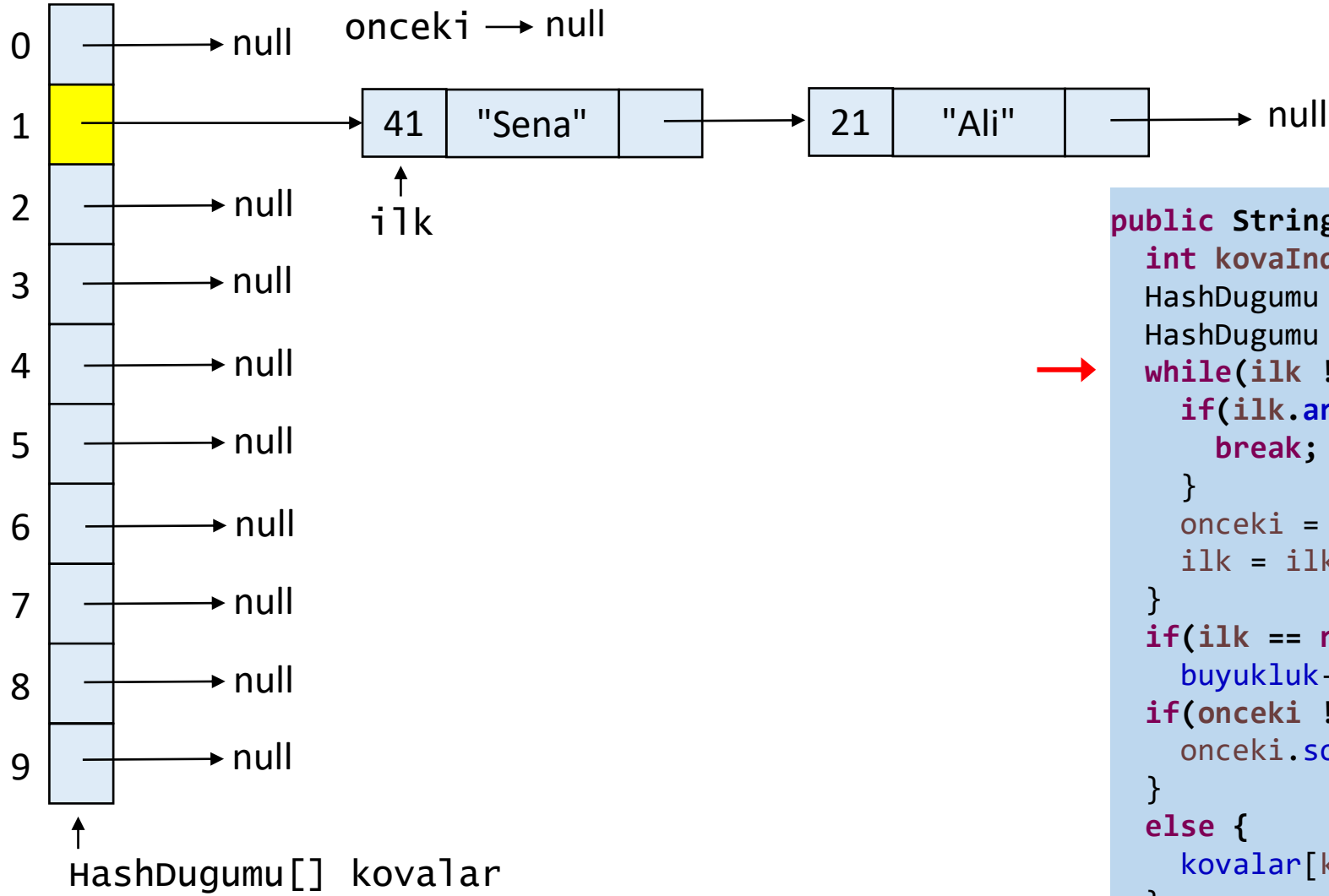


kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(41);

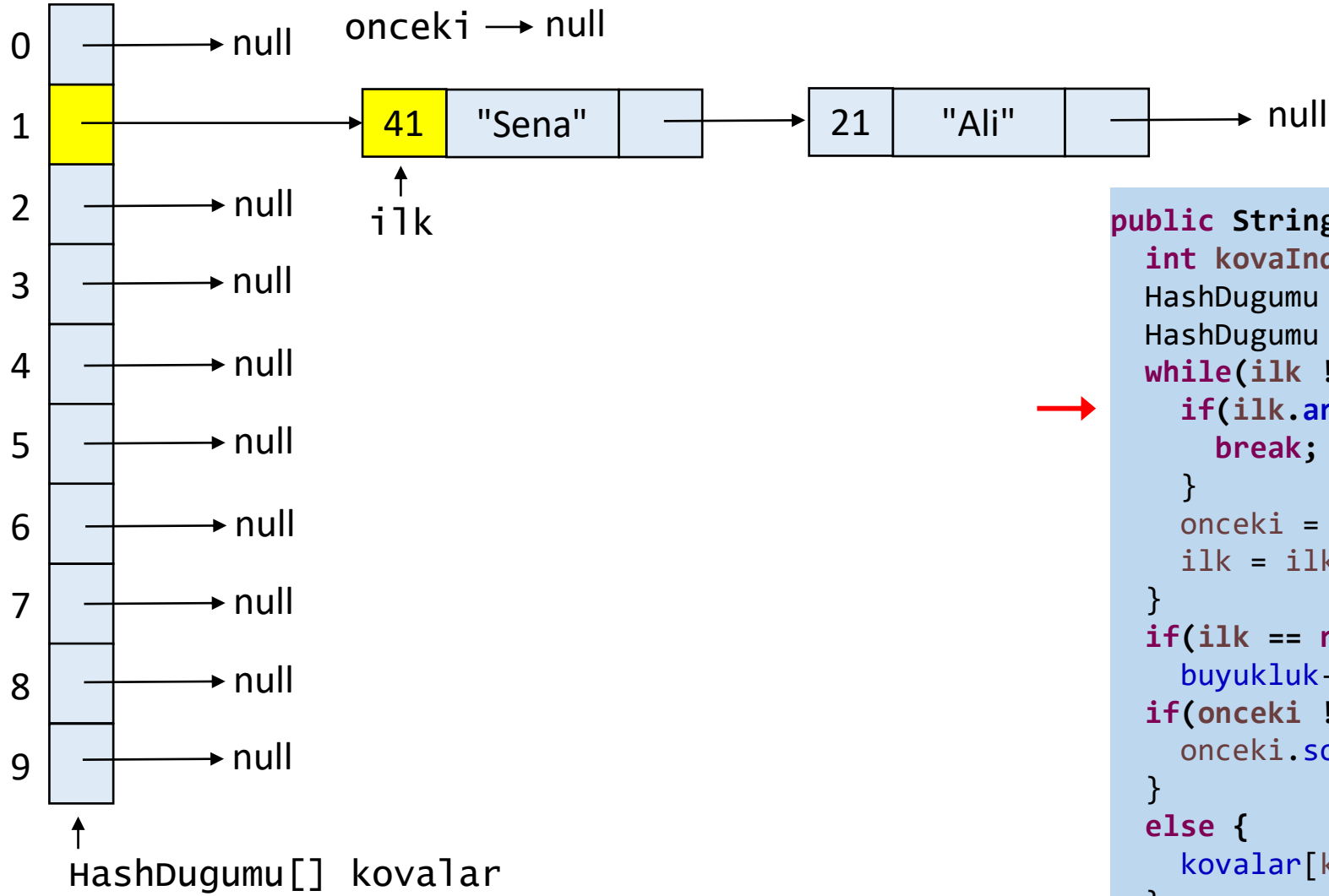


kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(41);

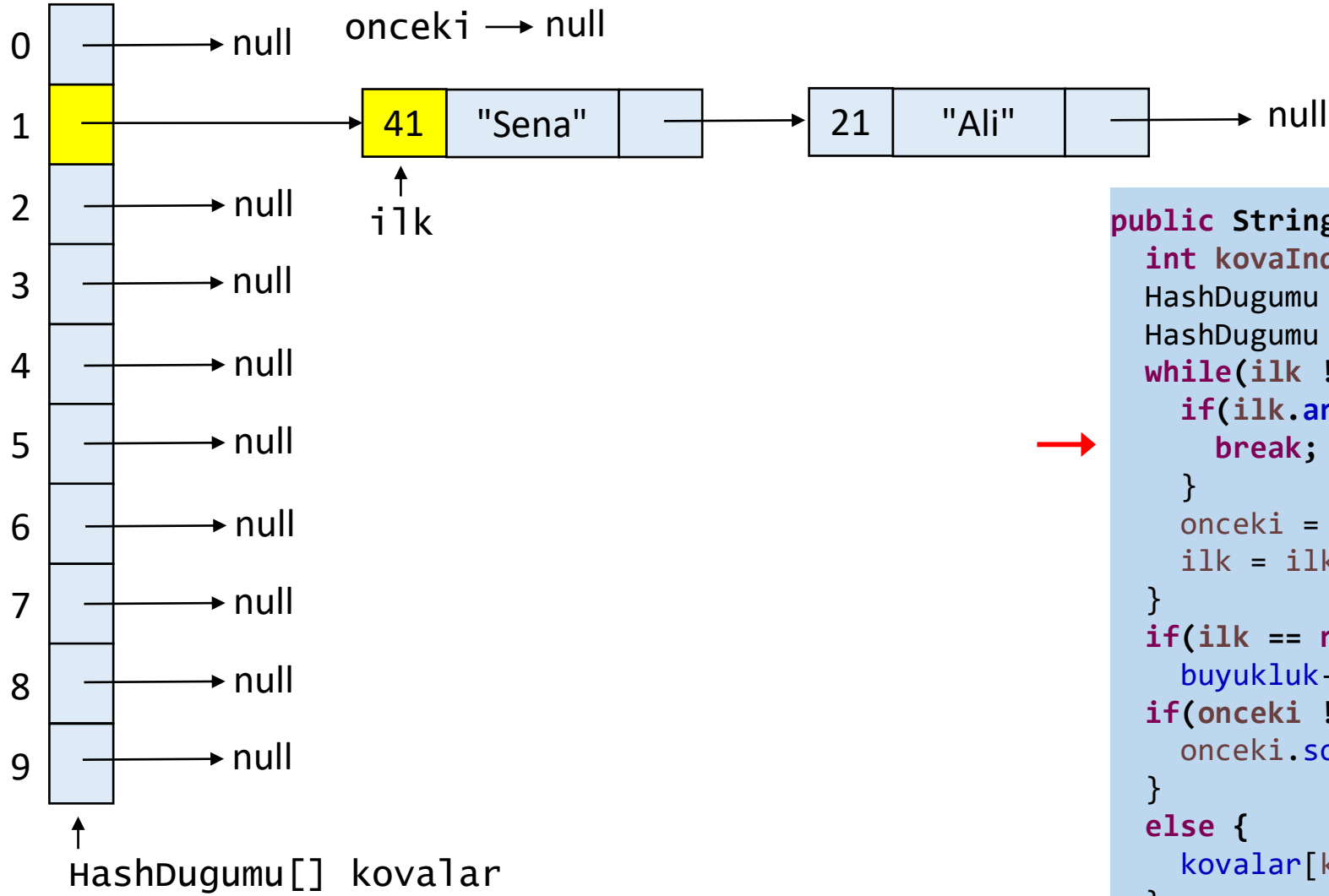


kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(41);

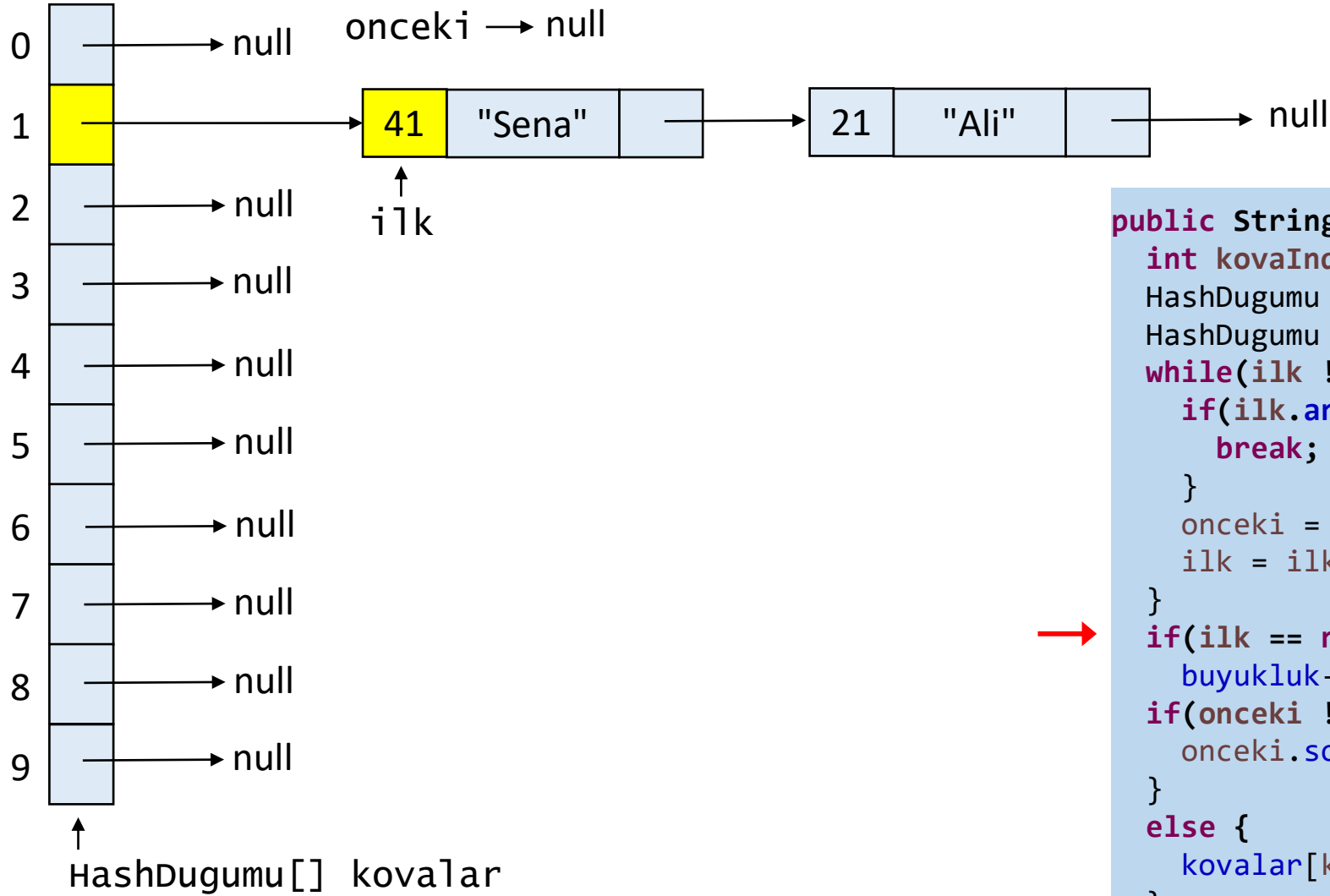


kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1



```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(41);



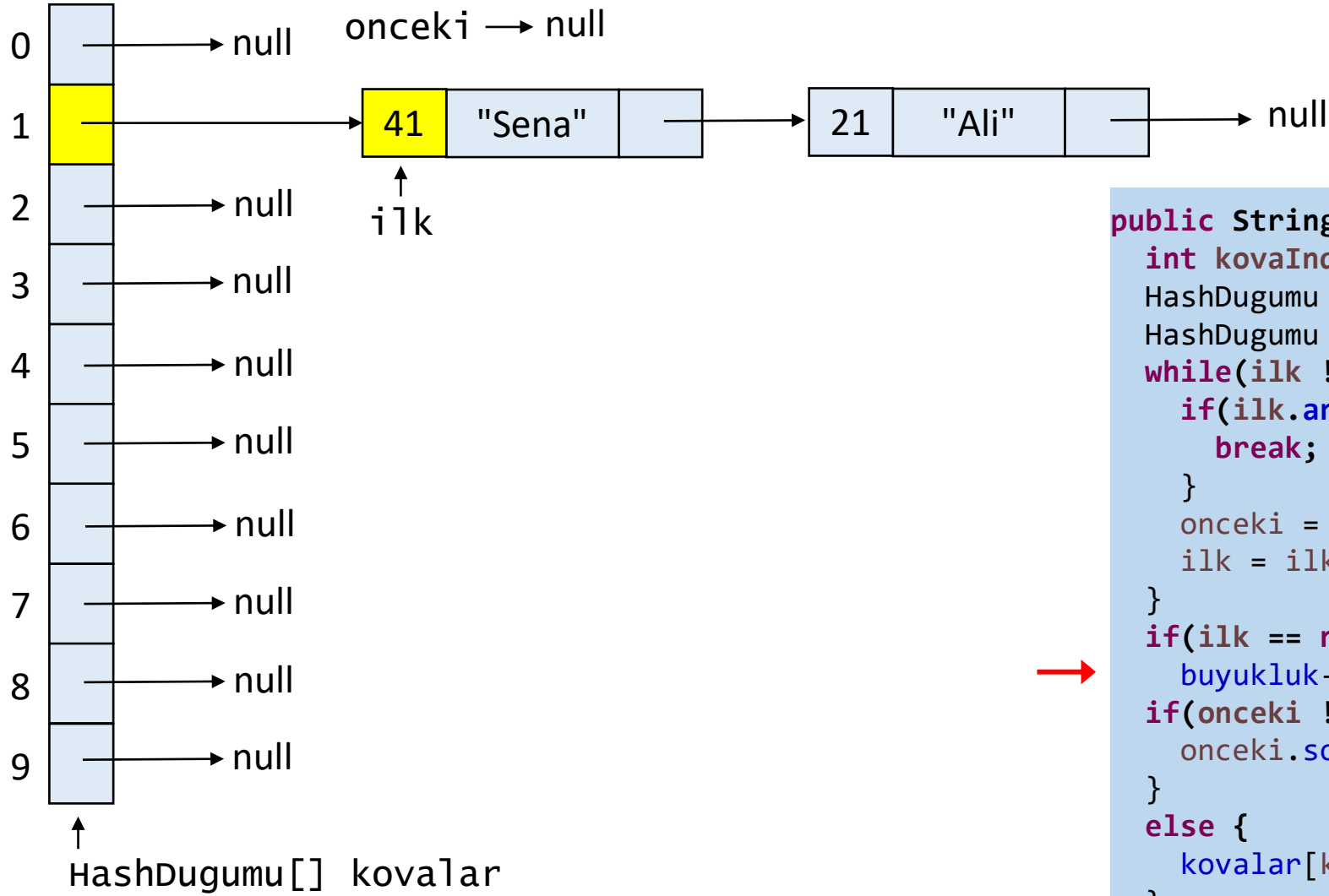
kovaSayisi = 10
 buyukluk = 2
 anahtar = 41
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(41);



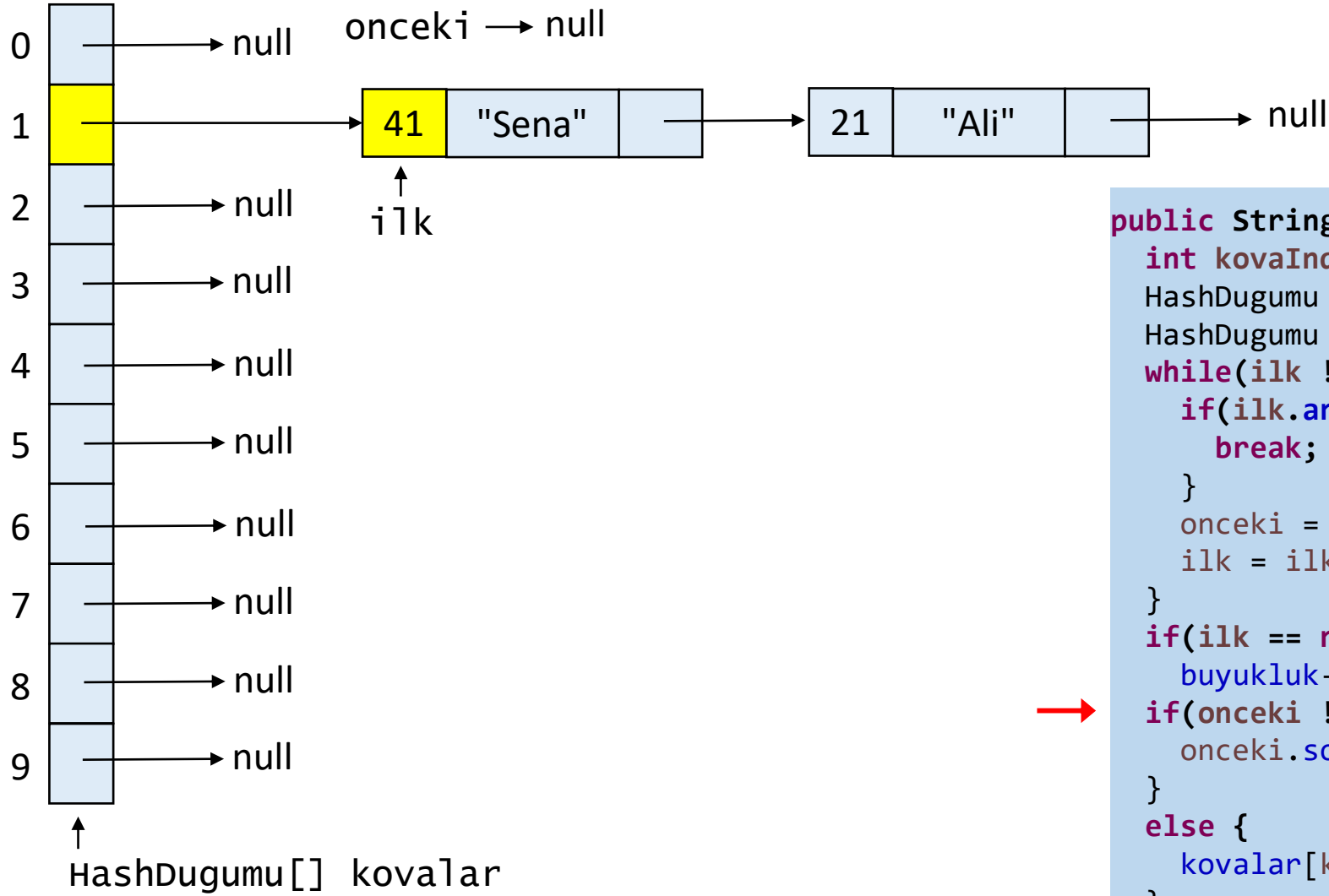
kovaSayisi = 10
 buyukluk = 1
 anahtar = 41
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(41);



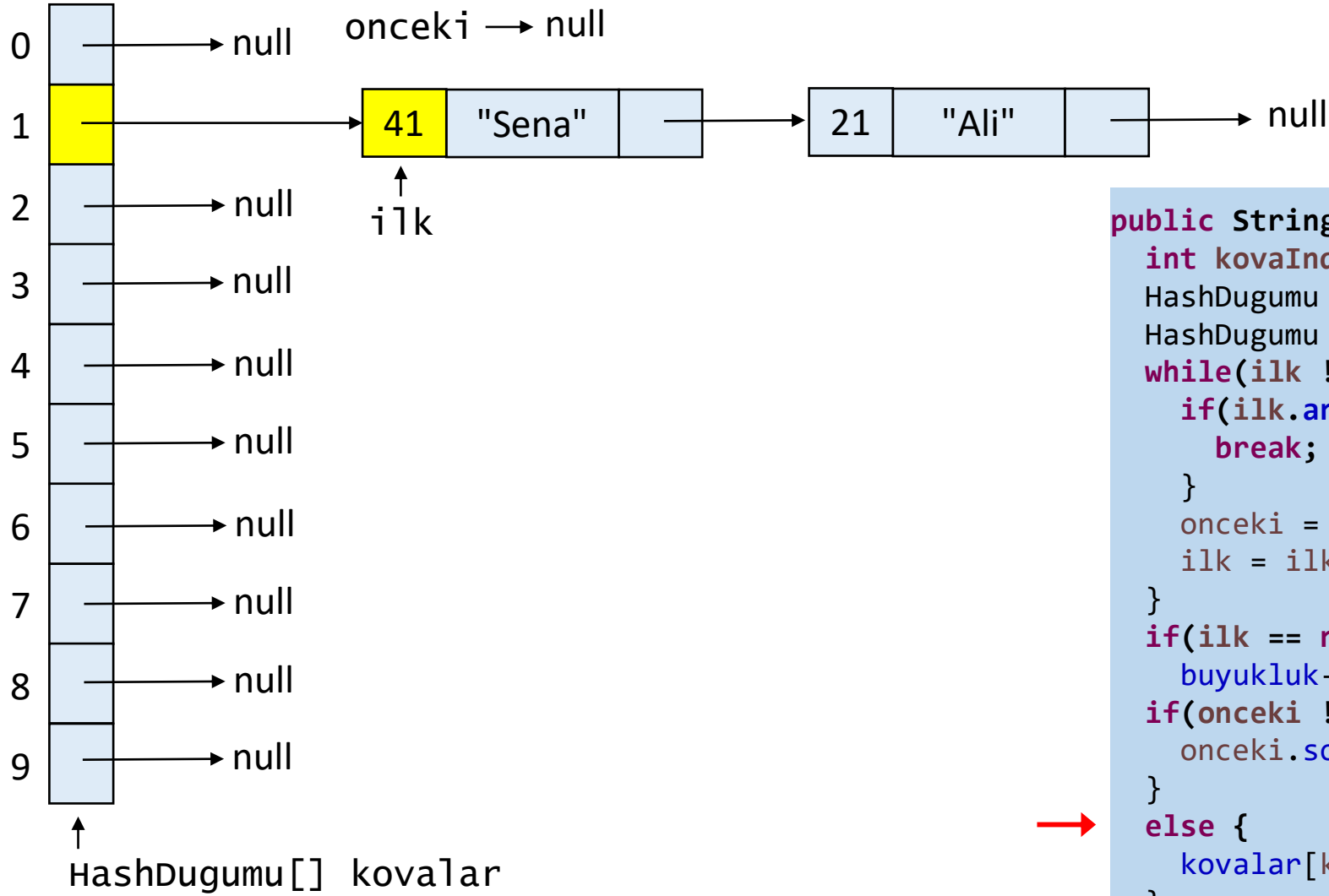
kovaSayisi = 10
 buyukluk = 1
 anahtar = 41
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(41);



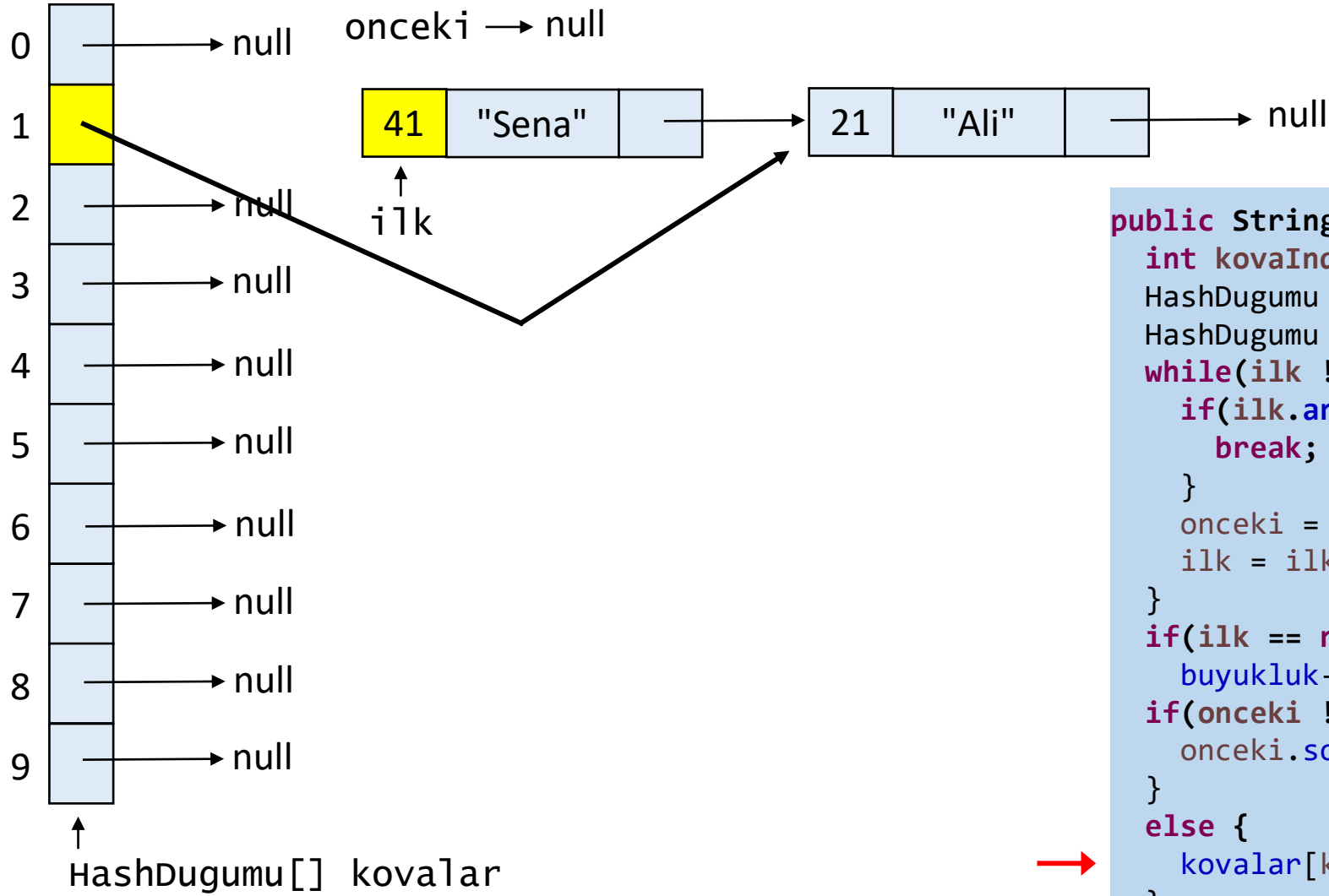
kovaSayisi = 10
 buyukluk = 1
 anahtar = 41
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(41);



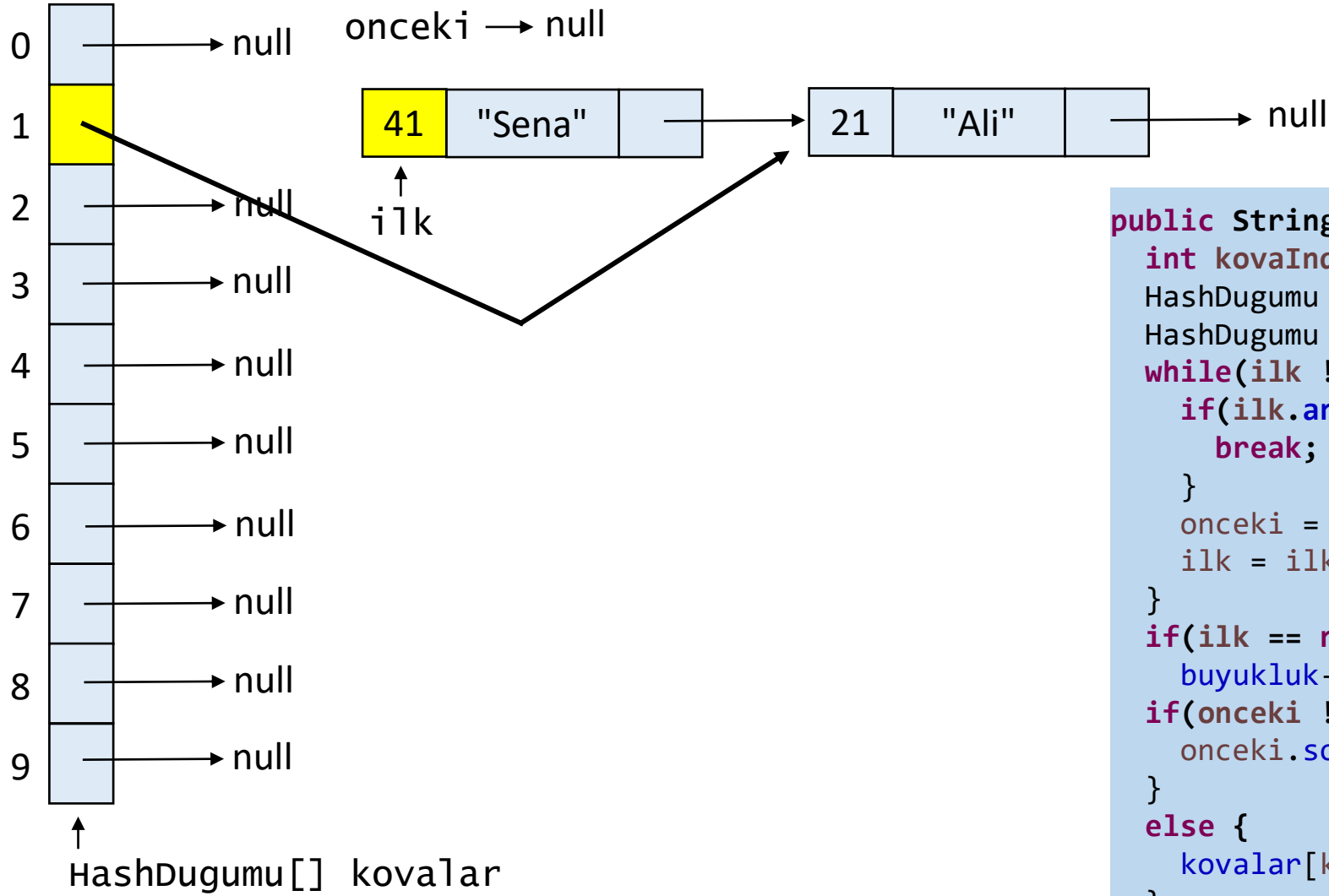
kovaSayisi = 10
 buyukluk = 1
 anahtar = 41
 kovaIndeksi = 1

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(41);

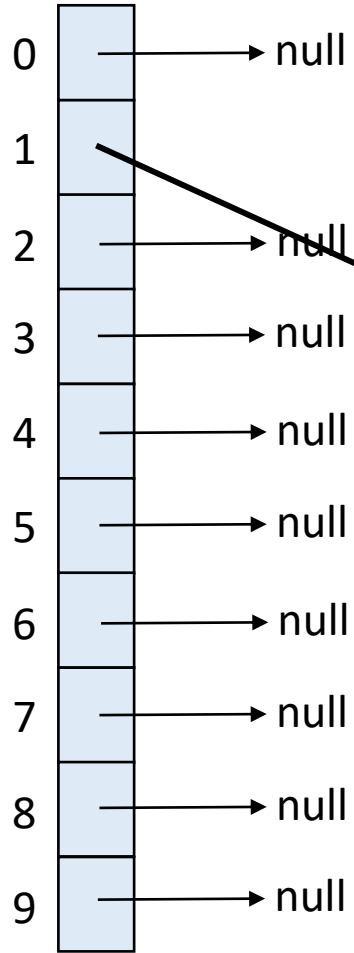


kovaSayisi = 10
 buyukluk = 1
 anahtar = 41
 kovaIndeksi = 1

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```



tablo.sil(41);

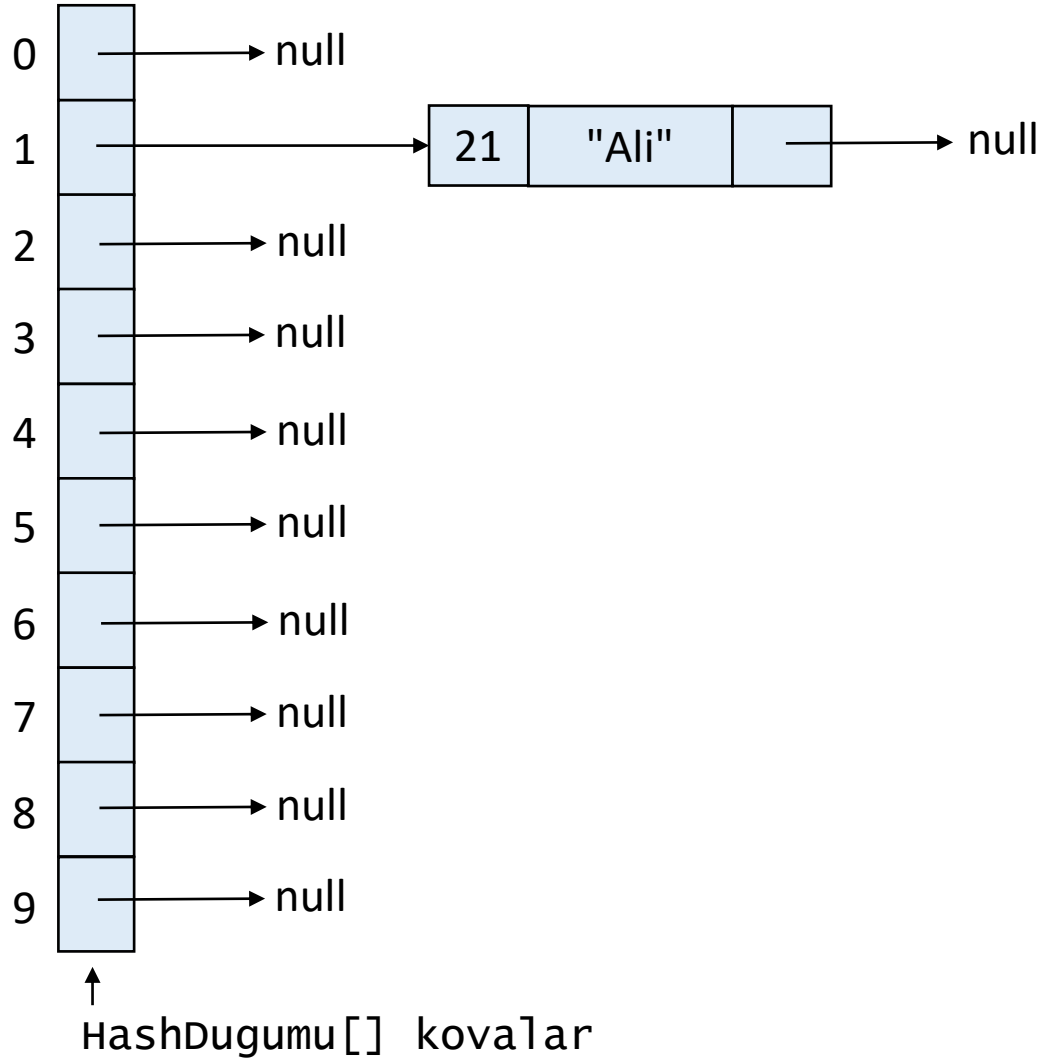


↑
HashDugumu[] kovalar



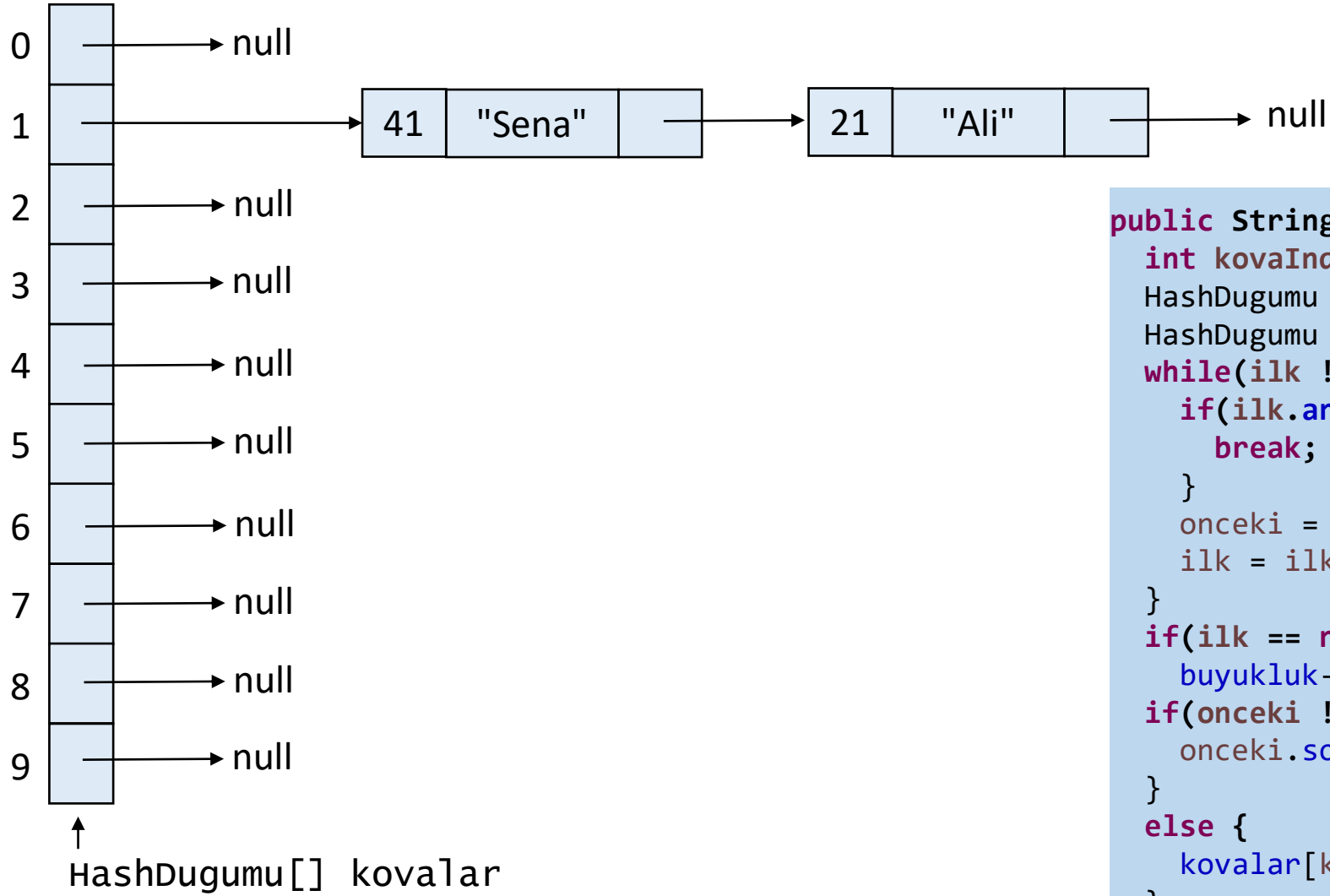
kovaSayisi = 10
buyukluk = 1

```
public String sil(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    HashDugumu onceki = null;  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            break;  
        }  
        onceki = ilk;  
        ilk = ilk.sonraki;  
    }  
    if(ilk == null) { return null; }  
    buyukluk--;  
    if(onceki != null) {  
        onceki.sonraki = ilk.sonraki;  
    }  
    else {  
        kovalar[kovaIndeksi] = ilk.sonraki;  
    }  
    return ilk.deger;  
}
```



kovaSayisi = 10
buyukluk = 1

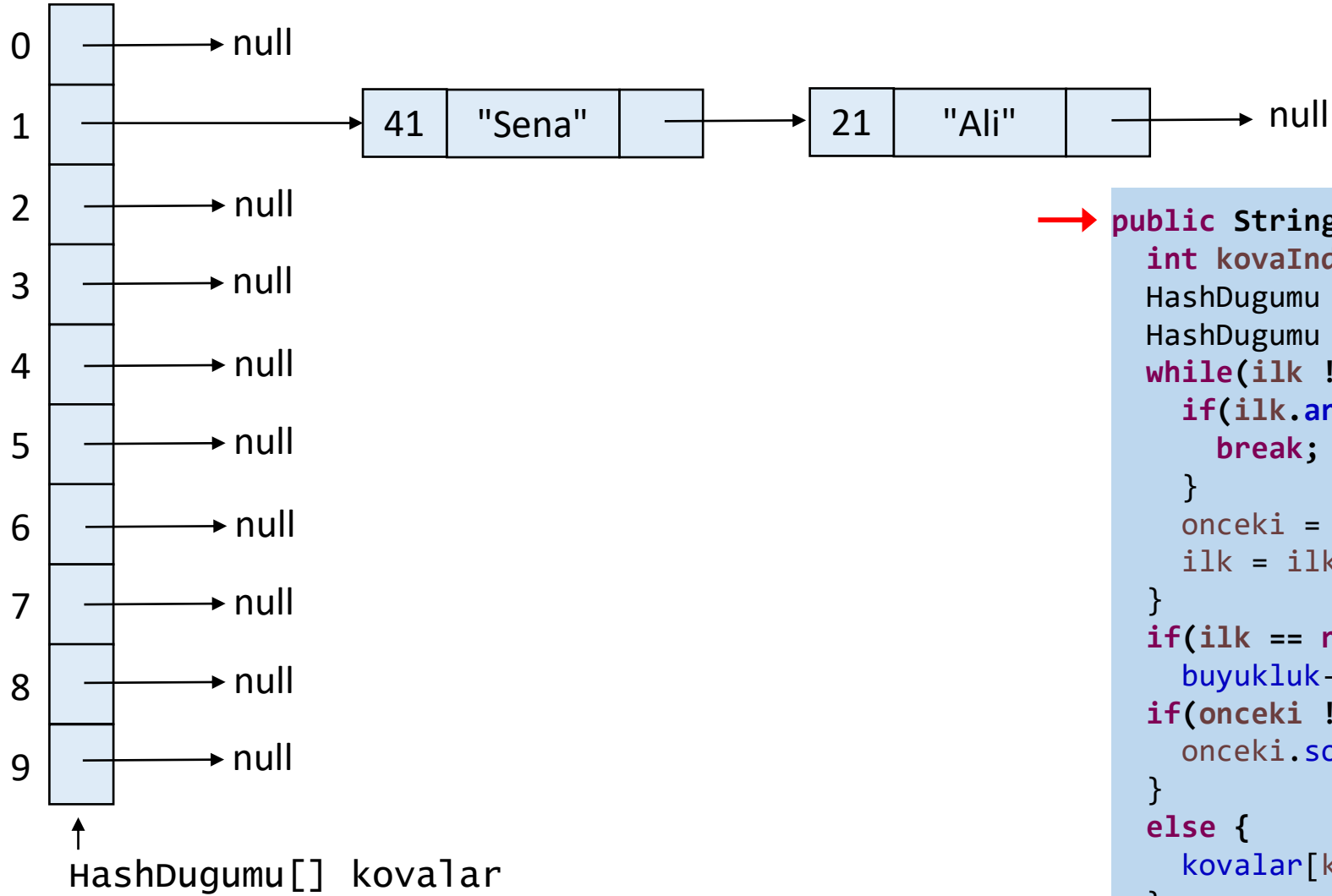
```
public String sil(Integer anahtar) {  
    int kovaIndeksi = getKovaIndeksi(anahtar);  
    HashDugumu ilk = kovalar[kovaIndeksi];  
    HashDugumu onceki = null;  
    while(ilk != null) {  
        if(ilk.anahtar.equals(anahtar)) {  
            break;  
        }  
        onceki = ilk;  
        ilk = ilk.sonraki;  
    }  
    if(ilk == null) { return null; }  
    buyukluk--;  
    if(onceki != null) {  
        onceki.sonraki = ilk.sonraki;  
    }  
    else {  
        kovalar[kovaIndeksi] = ilk.sonraki;  
    }  
    return ilk.deger;  
}
```

kovaSayisi = 10
buyukluk = 2

```
public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
```

tablo.sil(88);

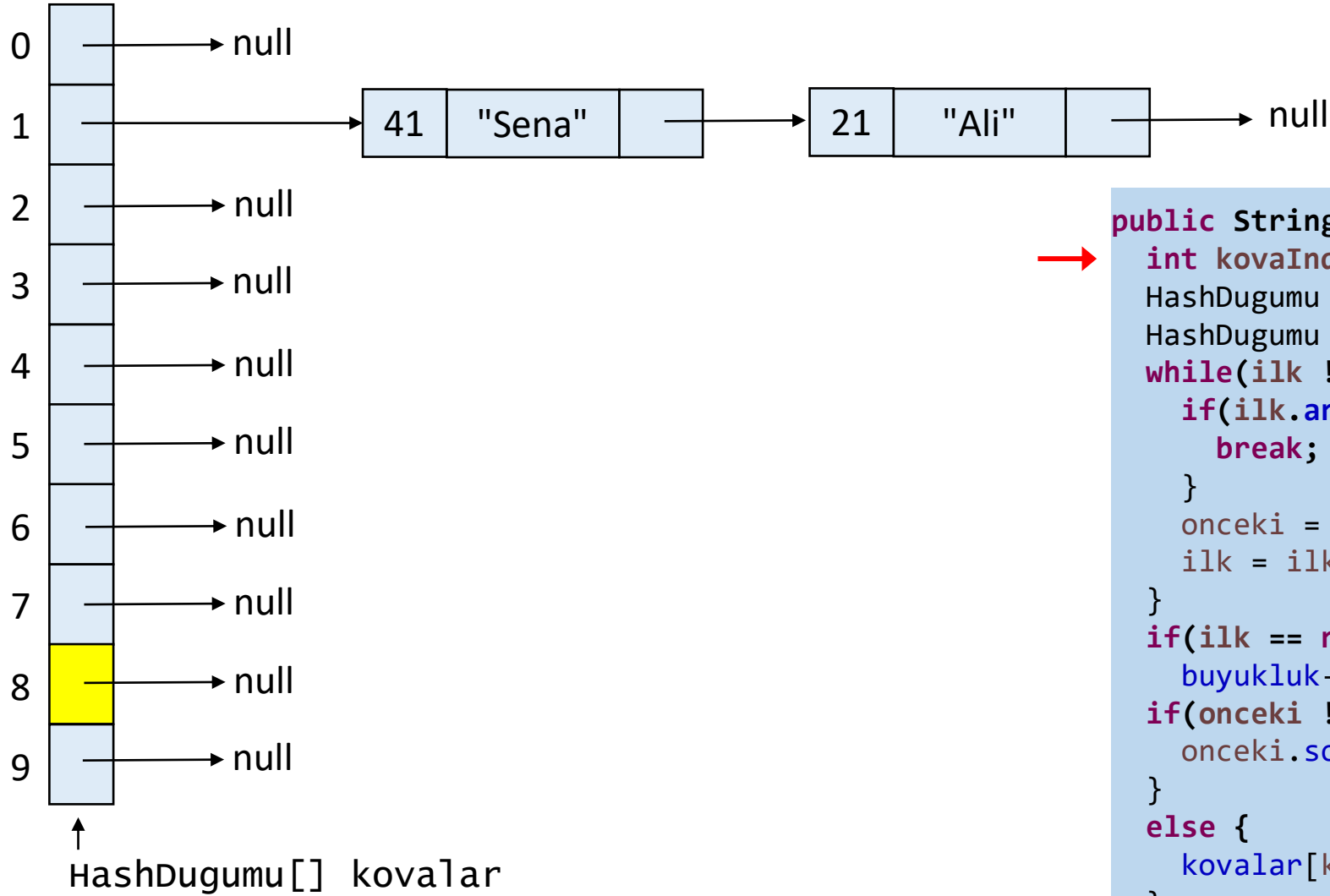


kovaSayisi = 10
 buyukluk = 2
 anahtar = 88

```

→ public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```

tablo.sil(88);

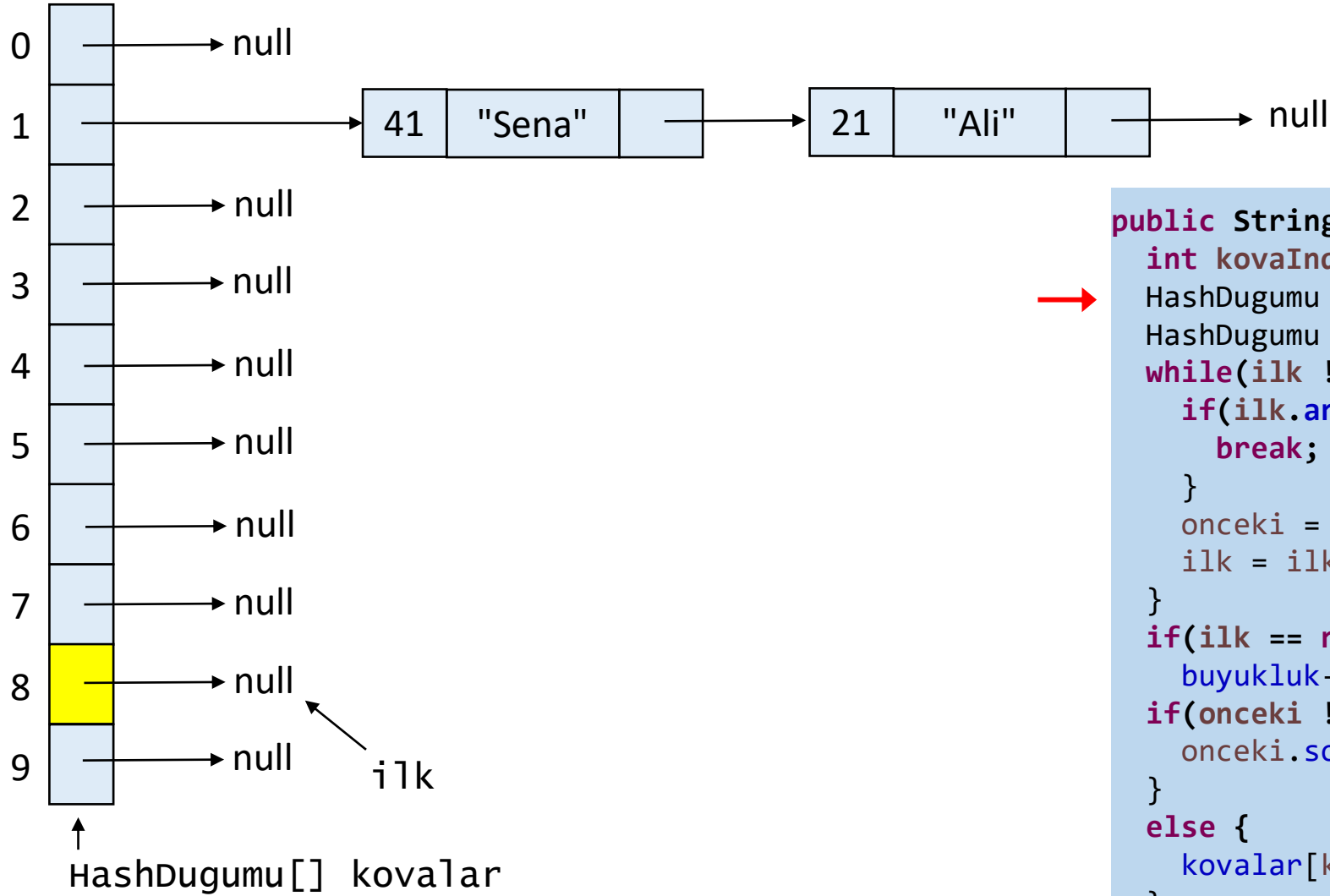


kovaSayisi = 10
 buyukluk = 2
 anahtar = 88
 kovaIndeksi = 8

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```

tablo.sil(88);



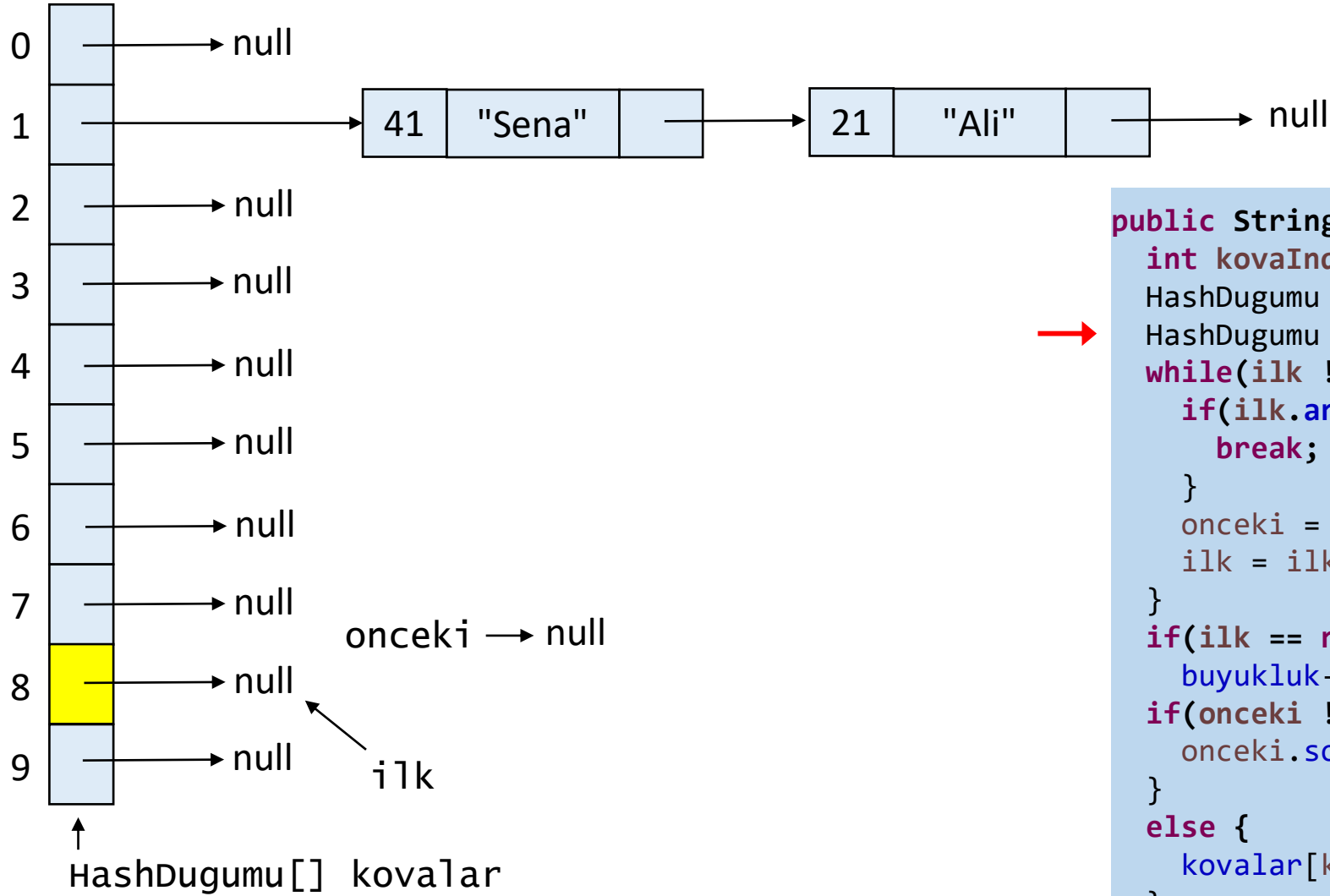
kovaSayisi = 10
 buyukluk = 2
 anahtar = 88
 kovaIndeksi = 8

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(88);



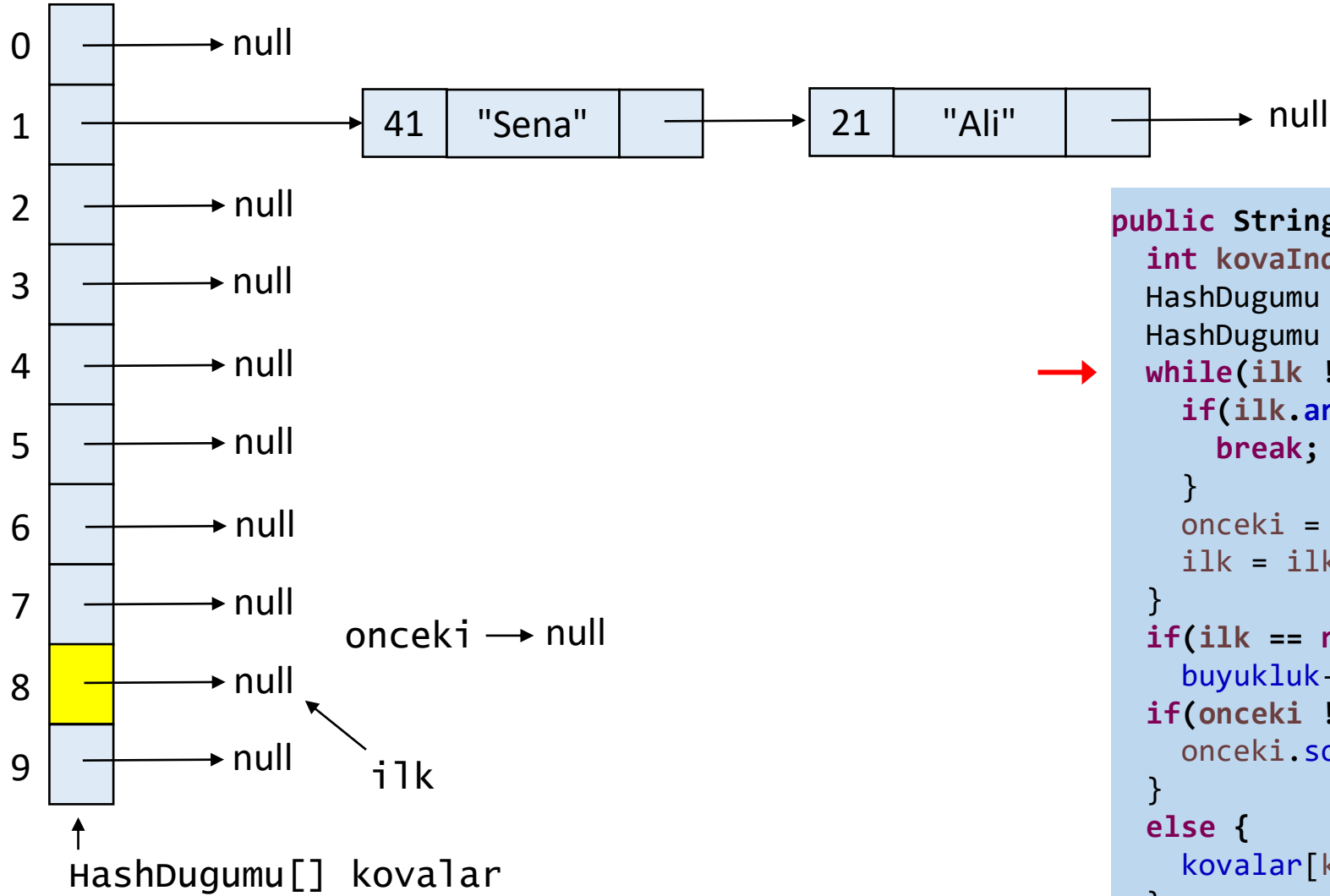
kovaSayisi = 10
 buyukluk = 2
 anahtar = 88
 kovaIndeksi = 8

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(88);



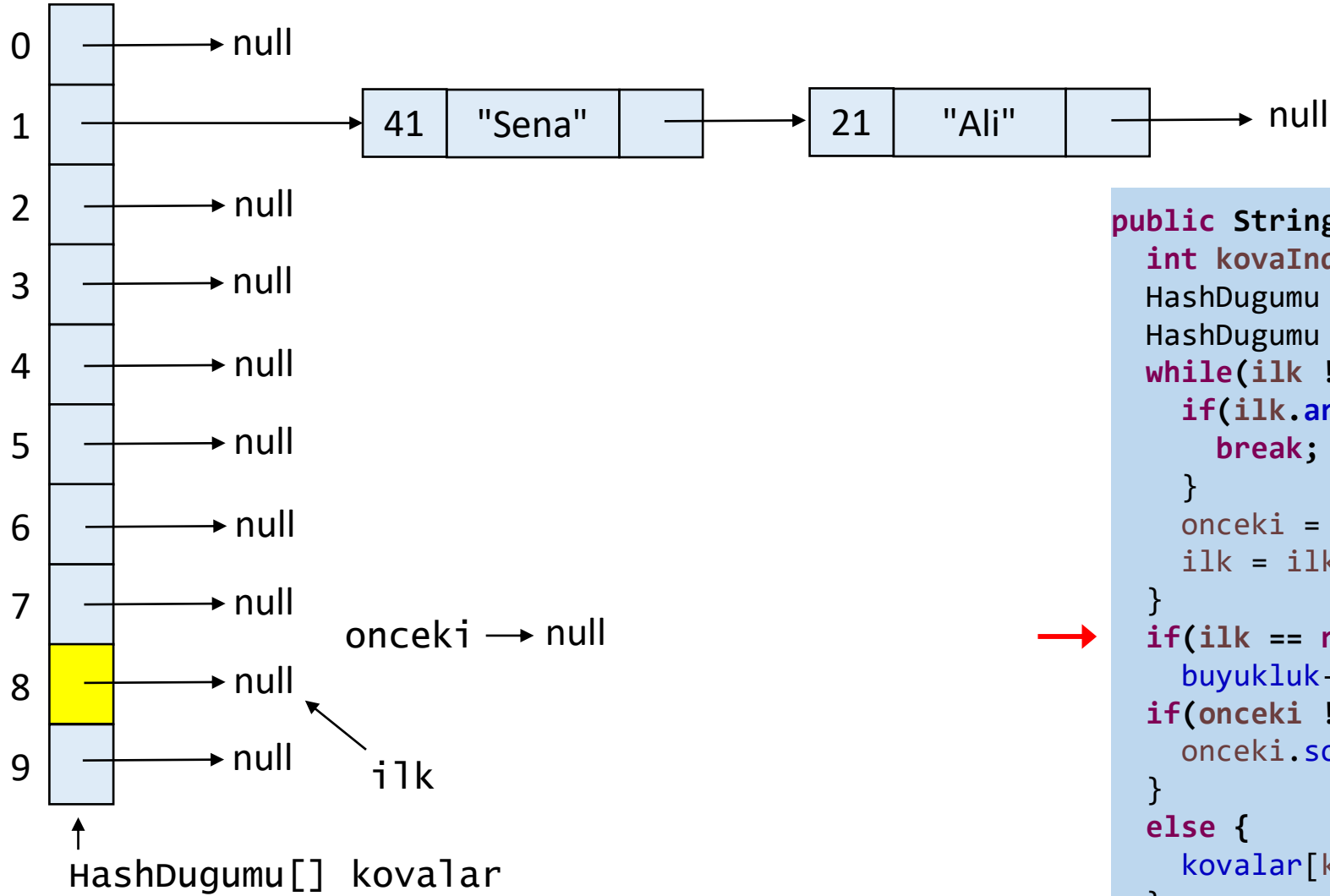
kovaSayisi = 10
 buyukluk = 2
 anahtar = 88
 kovaIndeksi = 8

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```

tablo.sil(88);



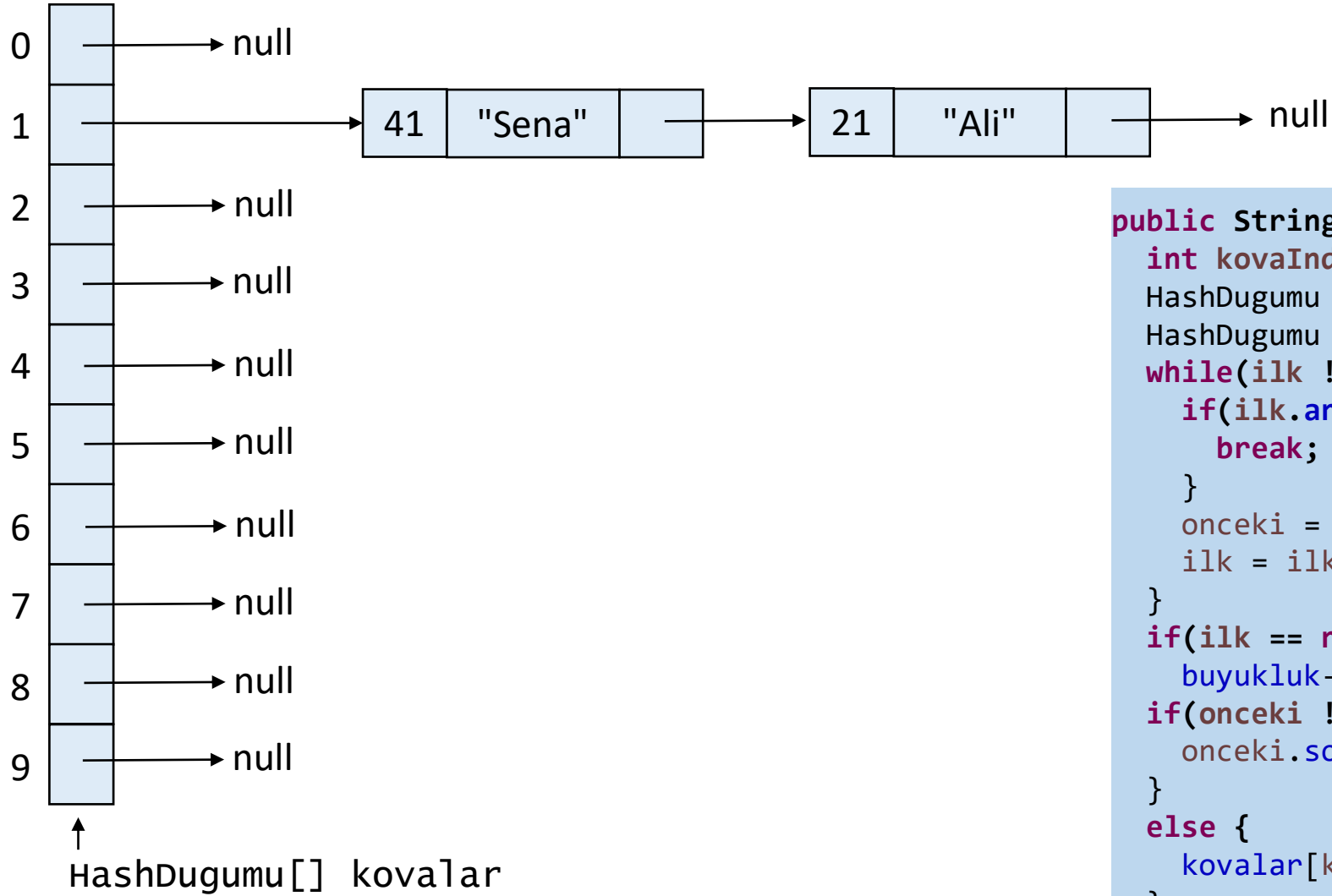
kovaSayisi = 10
 buyukluk = 2
 anahtar = 88
 kovaIndeksi = 8

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}
  
```



tablo.sil(88);



kovaSayisi = 10
buyukluk = 2

```

public String sil(Integer anahtar) {
    int kovaIndeksi = getKovaIndeksi(anahtar);
    HashDugumu ilk = kovalar[kovaIndeksi];
    HashDugumu onceki = null;
    while(ilk != null) {
        if(ilk.anahtar.equals(anahtar)) {
            break;
        }
        onceki = ilk;
        ilk = ilk.sonraki;
    }
    if(ilk == null) { return null; }
    buyukluk--;
    if(onceki != null) {
        onceki.sonraki = ilk.sonraki;
    }
    else {
        kovalar[kovaIndeksi] = ilk.sonraki;
    }
    return ilk.deger;
}

```






SON