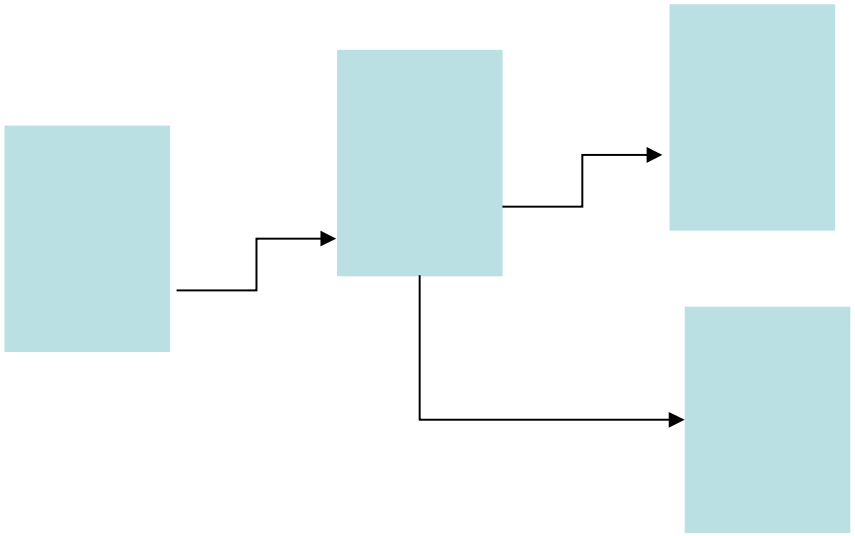
2.0.2. Egitura estekatuak

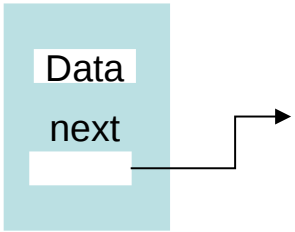
Egitura estekatu baten ezaugarriak

- Datu-egiturak dira, objektuen erreferentzia-aldagaiak erabiltzen dituzte beste objektuen estekak izan ahal izateko



Egitura estekatu baten diseinua

- Orokorrean, adabegien klase bat egongo da. Adabegi batek hau izango du:
  - Datuak eta
  - Adabegi klasearen erreferentzia bat edo gehiago (definizio errekurtsiboa)



Lehen hurbilpena(I)

```
public class Pertsona {
   private String name;
   private String na;
   private Pertsona next; // hurrengo pertsonaren atzipena!

   public Pertsona(String pName, String pNa) { // Eraikitzailea
      name = pName;
      na= pNa;
      next = null;
   }
   public void setNext(Pertsona next) { this.next = next; }

   public void print() { // Dena idazten du
}
```

Lehen hurbilpena (II)

```
public static void main(String[] args) {

   Pertsona p1 = new Pertsona("pepe", "1111");
   Pertsona p2 = new Pertsona("ana", "2222");
   Pertsona p3 = new Pertsona("jon", "3333");
   Pertsona p4 = new Pertsona("amaia", "1212");

   p1.setNext(p2);
   p2.setNext(p3);
   p3.setNext(p4);
```

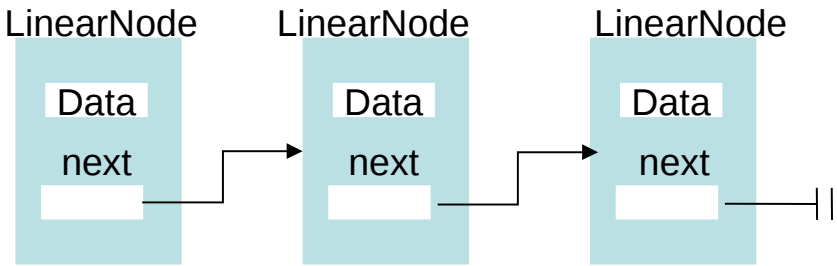
Lehen hurbilpena(III)

- Pertsona klasea,
  - Pertsona bat da?
  - Edo pertsona-multzo bat?
  - Zer idazten du print-ek? Zer idatzi beharko luke?

- Aurreko inplementazioa badabil, baina diseinu ez egokia du
  - Pertsona klasea eta PertsonenZerrenda klaseak desberdinak dira

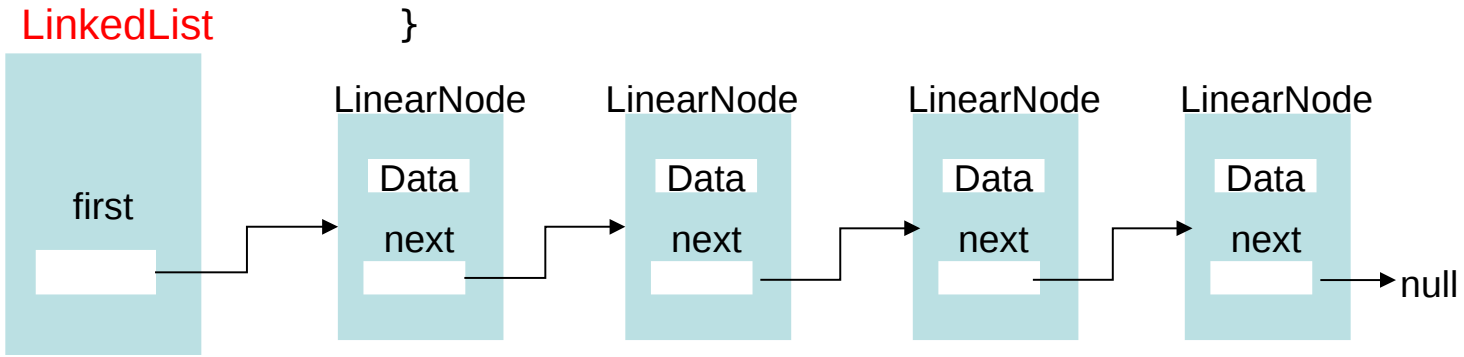
Adabegi baten definizioa

```
public class LinearNode
   {
   public Pertsona data;      // datuak adabegian
   public LinearNode next;  // hurrengo adabegia
    }
```

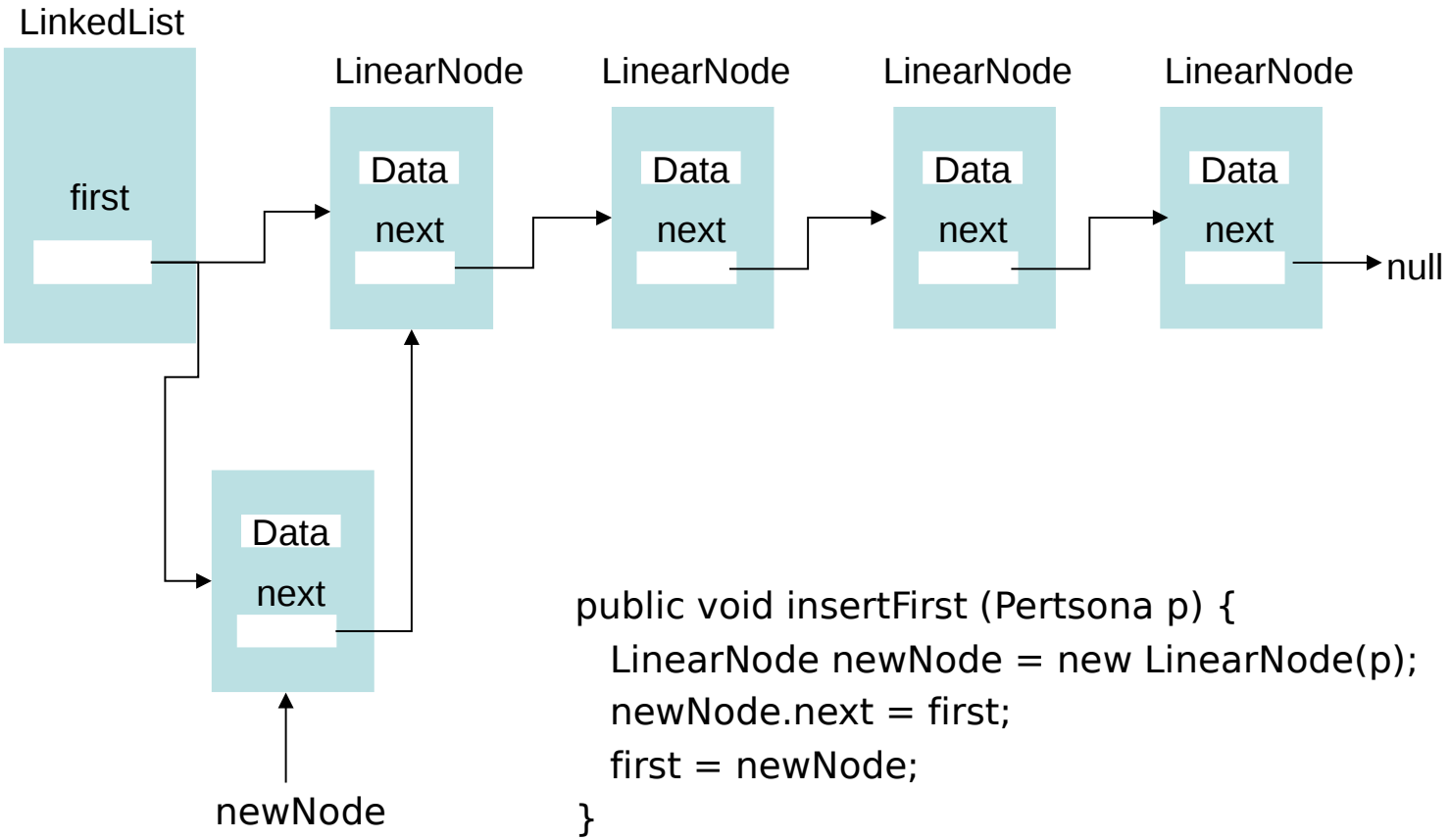


Egitura estekatuaren definizioa

```
class LinkedList
  {
    private LinearNode first;  // adabegi berezi baten erreferentzia
    // aukerazko atributuak: int size, ...

    public LinkedList() {            // eraikitzailea
      first = null;
    }
    public boolean isEmpty()  {.....}
    public void insertFirst(Pertsona p)  {.....}
    public Pertsona deleteFirst()  {.....}
    public void displayList()  {.....}
    public Pertsona find(Pertsona p) {.....}
    public Pertsona delete(Pertsona p) {.....}
  }
```



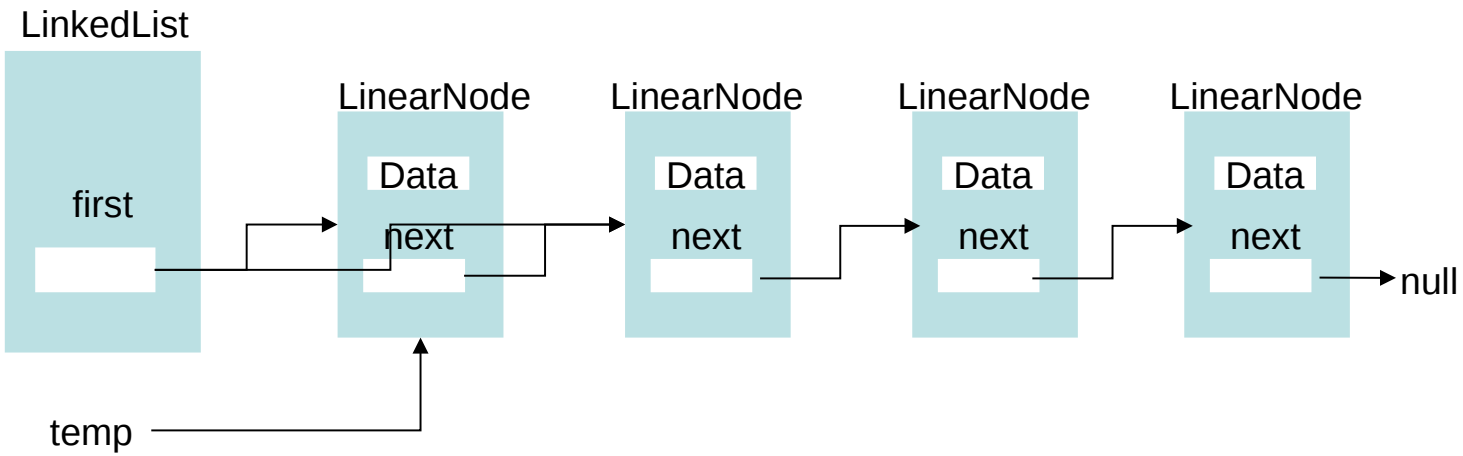
Txertaketa hasieran




```
public void insertFirst (Pertsona p) {
   LinearNode newNode = new LinearNode(p);
   newNode.next = first;
   first = newNode;
}
```

Kostua: O(1)

Lehenengoa ezabatu




```
public Pertsona deleteFirst ( ) {
   Pertsona temp = first.data;
   first = first.next;
   return temp;
}
```

Kostua: O(1)

Egiturako datuak inprimatu

```
public void displayList()
    {
    System.out.print("List (first-->last): ");
    LinearNode current = first;  // start at beginning of list
    while(current != null)         // until end of list,
       {
       current.displayLink();   // print data
       current = current.next;  // move to next node
       }
    System.out.println("");
    }
```

Kostua: O(n)

n: egiturako adabegi-kopurua

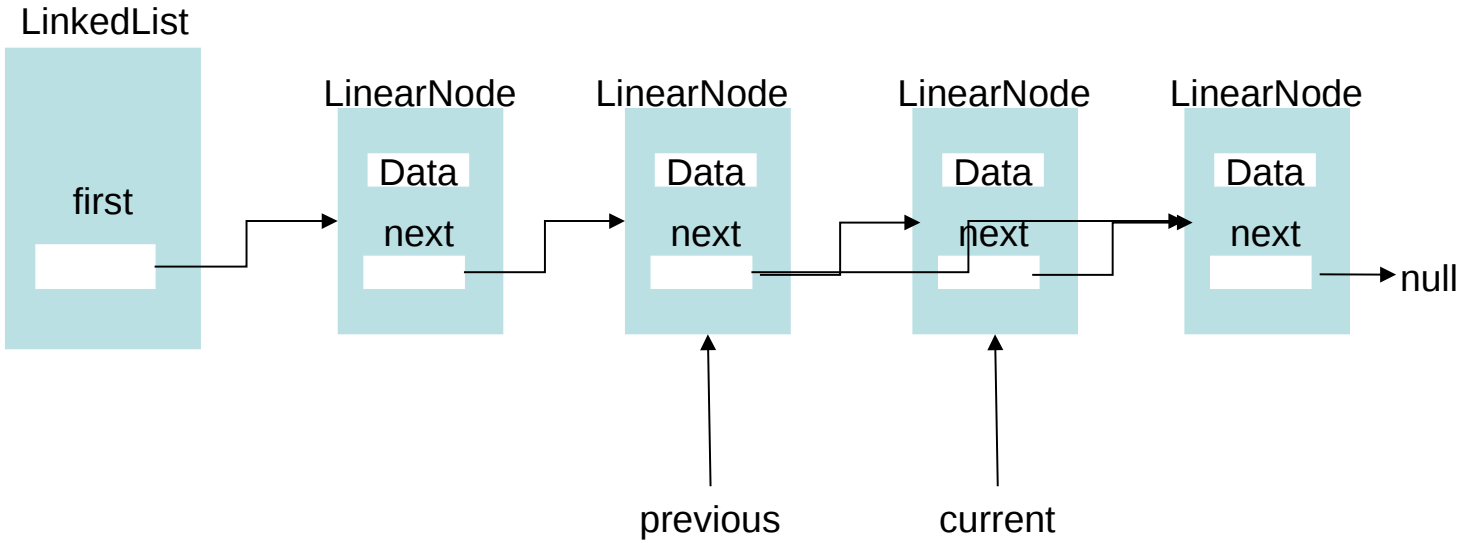
- Ikusi Link.java, LinkList.java eta LinkListApp.java

Bilatu balio jakin bateko adabegia

```
public Pertsona find(Pertsona p)      // find node with given key
    {                                 // (assumes non-empty list)
    LinearNode current = first;                  // start at 'first'
    while(!current.data.equals(p))       // while no match,
      {
      if(current.next == null)        // if end of list,
        return null;                  // didn't find it
      else                            // not end of list,
        current = current.next;       // go to next link
      }
    return current.data;                         // found it
    }
```

Kostua: O(n)

Ezabatu balio jakin bateko adabegia



Ezabatu balio jakin bateko adabegia

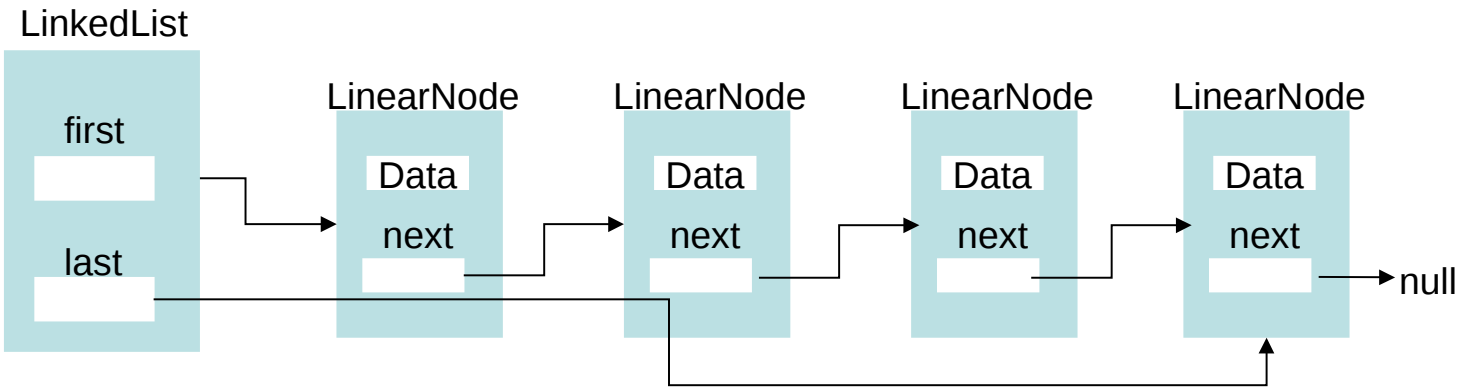
```
public Pertsona delete(Pertsona p)    // delete link with given key
    {                 // Precondition: there exists an element with the given key
                      // (assumes non-empty list)

    LinearNode current = first;              // search for link
    LinearNode previous = first;

    while (!current.data.equals(p)) {
      if(current.next == null)
        return null;                 // didn't find it
      else
        {
        previous = current;          // go to next link
        current = current.next;
        }
      }
                          // found it
    if (current == first)                     // if first link,
      first = first.next;                     //    change first
    else                                      // otherwise,
      previous.next = current.next;   //    bypass it
    return current.data;
    }
```

Kostua: O(n)

Iteradore bat eskaintzeko?

```
/** Return an iterator to the stack that iterates through the items . */
public Iterator iterator() { return new ListIterator(); }

// an iterator, doesn't implement remove() since it's optional
private class ListIterator implements Iterator {

   private LinearNode current = first;

   public boolean hasNext() { return current != null; }

   public void remove() {
          throw new UnsupportedOperationException(); }

   public Pertsona next() { // recorre el campo clave
      if (!hasNext()) throw new NoSuchElementException();
      Pertsona item = current.Data;
      current = current.next;
      return item;
    }

} // private class
```

Bukaeran txertatzeko, komeni da azkenaren atzipena izatea



- Ikusi FirstLastList.java
- 4. kapitulua aztertu: Linked structures [Lewis eta Chase 2010]