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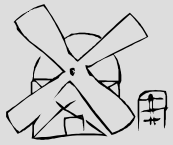

Die ObjektOrientierte Mühle

Das Beispiel soll noch einmal das Konzept der Objektorientiertheit erläutern.

Dabei werden außerdem Interfaces, Vererbung, abstrakte Methoden, Queues, SimplyLinked Lists, Exceptions, ... verwendet.

9.2.2004

verschiedene Muehlen

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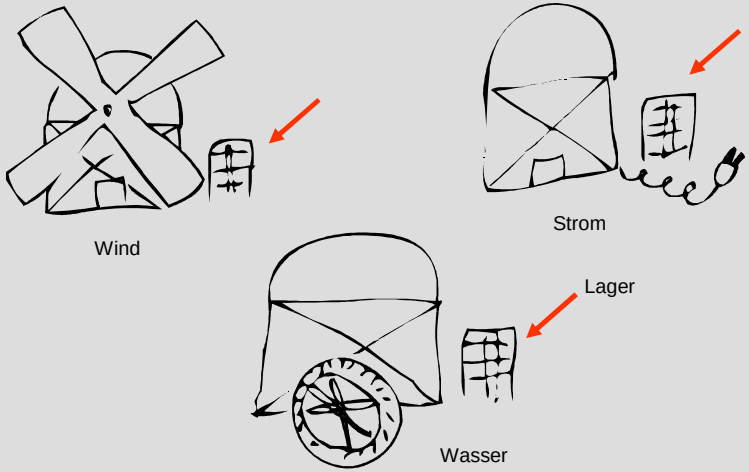

Muehle

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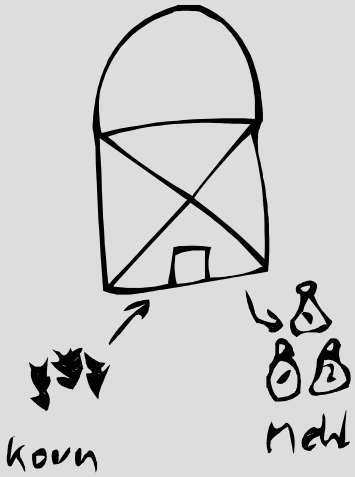
```
public interface IMuehle {

    public Id anliefern(Korn korn);

    public void mahlen();

    public MehlSack abholen();
}
```



-> UML

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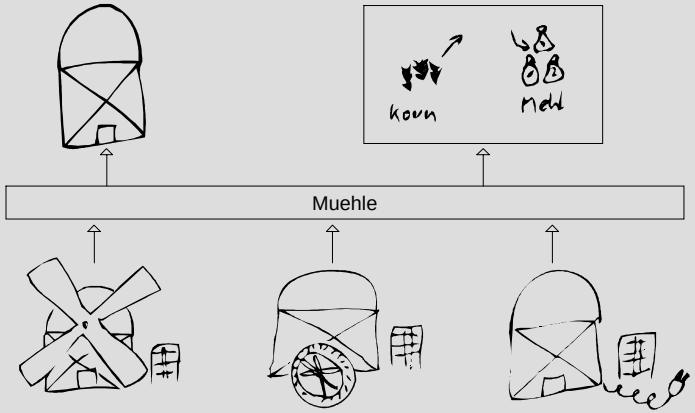

UML-Vererbungs-Diagramm

5

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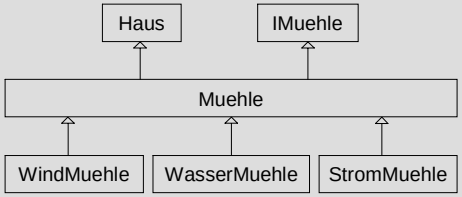

Muehle.java

6

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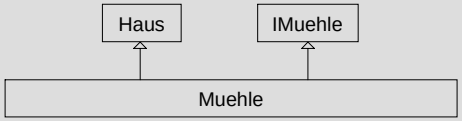


```
public abstract class Muehle extends Haus implements IMuehle {
   protected LagerQueue kornlager;  protected LagerQueue mehllager;

   public Id anliefern(Korn korn){
      new Id(); kornlager.push(theId);
      return theId;
   }

   public abstract void mahlen() throws MahlException;

   public MehlSack abholen(){
      return (MehlSack) mehllager.pop();
   }
}
```

WindMuehle.java

7

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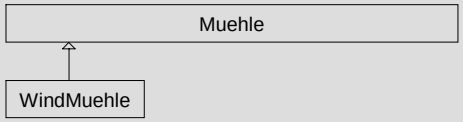


```
public class WindMuehle extends Muehle {
   private boolean wind = true;

   public WindMuehle(String name){
      super(name);
   }

   public void mahlen() throws KeinWindException{
      while(kornlager.top() != null){
         if (!wind) throw new KeinWindException();
         Id inBearbeitungId = (Id) kornlager.pop();
         // mahlen mit Wasser
         mehllager.push(new MehlSack(inBearbeitungId));
      }
   }
}
```

Vorteil des Interface

8

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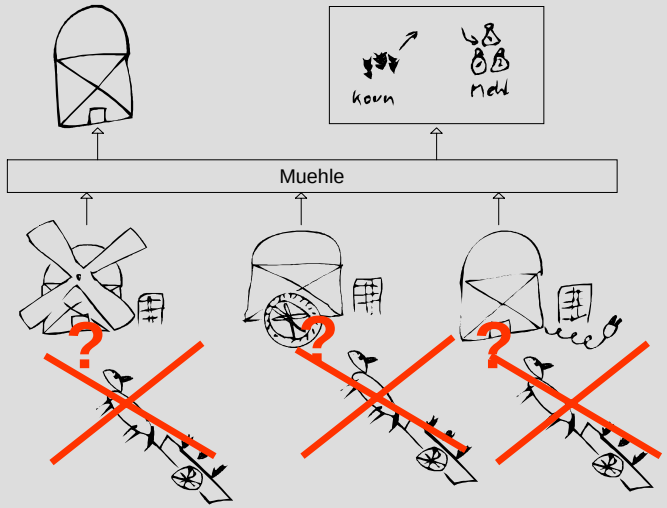

Vorteil des Interface

9

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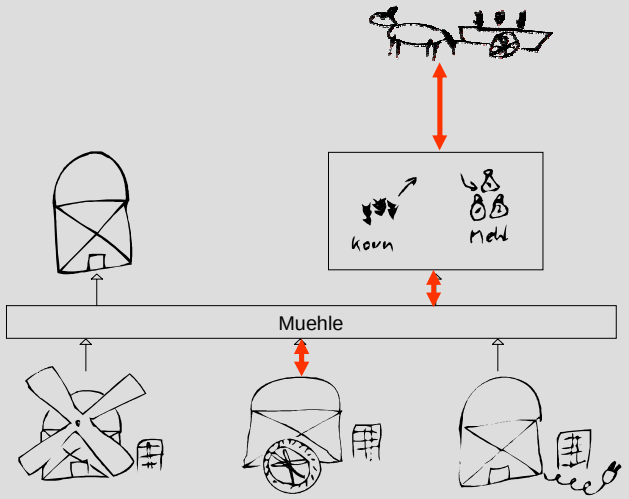

Vorteil der Instanzen/ Objekte

10

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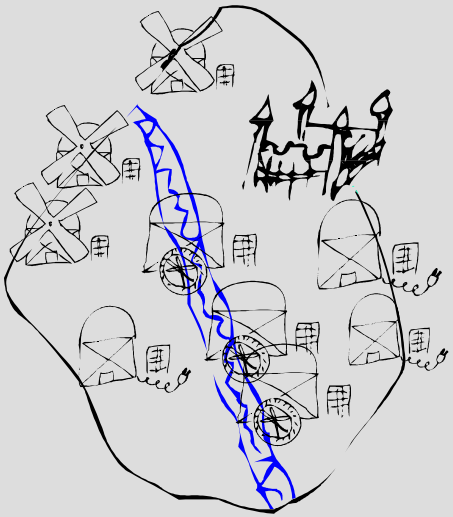

Der Test

11

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```
public static void main(String[ ] args) {
      IMuehle[ ] meineMuehlen = new IMuehle[4];
      meineMuehlen[0] = new WindMuehle("WindMühle A");
      meineMuehlen[1] = new WindMuehle("WindMühle B");
      meineMuehlen[2] = new StromMuehle("StromMühle");
      meineMuehlen[3] = new WasserMuehle("WasserMühle");

      // 10x wird Korn an zufällig gewählte Mühlen geliefert.
      for(int i=0; i<10; i++){
         meineMuehlen[(int) (4*Math.random())].anliefern(new Korn());
      }

      // alle Mühlen mahlen lassen
      try{ for(int i=0; i<4; i++) meineMuehlen[i].mahlen();
      }catch(MahlException e){  /* irgendetwas sinnvolles tun */  };

      // Lager von allen Mühlen leeren
      MehlSack sack;
      for(int i=0; i<4; i++)  while ((sack = meineMuehlen[i].abholen()) != null);
}
```

Die Queue

12

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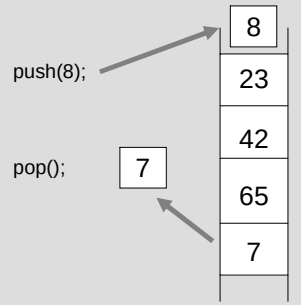
Queue: **F**irst**I**n**F**irst**O**ut:

```
public interface IObjectQueue {

   public void push(Object obj);

   public Object pop();

   public Object top();
}
```



SimplyLinked List

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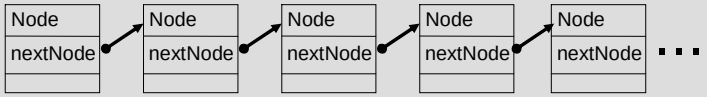


```
protected class Node{
   protected Node nextNode;
   protected Object nodeData;

   Node(Node next){ nextNode = next; }

   Node(Node next, Object data){ nextNode = next; nodeData = data; }

   void setNextNode(Node next){ nextNode = next; }

   void setData(Object data){ nodeData = data; }

   Node getNextNode(){ return nextNode; }

   Object getData(){ return nodeData; }
}
```

Die Queue

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```
public class LagerQueue implements IObjectQueue {
protected Node head;

public void push(Object obj){
   if (head == null) head = new Node(null, obj);
   else {
      Node actNode = head;

      while(actNode.getNextNode() != null) actNode = actNode.getNextNode();
      // Jetzt ist actNode der letzte Knoten

      actNode.setNextNode(new Node(null, obj));
      // Jetzt ist der neue Knoten hinten angehängt
       }
   }
   ...
}
```

Die Queue

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```
public class LagerQueue implements IObjectQueue {
protected Node head;

   public void push(Object obj){ ... }

   public Object top(){
      if (head == null) return null; else return head.getData();
    }

   public Object pop(){
      if (head == null) return null; // kein Knoten da

      Node res = head;
      head = res.getNextNode(); // ehemaliger Frontknoten ausgekettet
      return res.getData();          // Der ehemalig head wird garbagecollectet
   }
}
```