Nesneye Yönelik Programlama BLM2012

Öğr. Grv. Furkan ÇAKMAK

Ders Tanıtım Formu ve Konular

BLM2012 Nesneye Yönelik Programlama Hafta 9

Hafta	Tarih	Konular
1	01.03.2022	Dersin ve Java Dilinin Genel Tanıtımı, Sınıflar, Nesneler, Üyeler, Final ve Static Kavramları
2	08.03.2022	UML Sınıf Şemaları, Kurucular ve Sonlandırıcılar, Denetim Akışı, Nesneleri Oluşturulması
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6	05.04.2022	NYP'da Özel Konular: Abstract Classes, Interfaces, Enum Sınıfları
7	12.04.2022	Exception Handling, Unit Test
8	21.04.2022	1. Ara Sınav (10:00-12:00)
9	26.04.2022	Temel Veri Yapılarının Jenerik Sınıflar Eşliğinde Kullanımı (Liste ve Eşleme Yapıları).
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11	10.05.2022	Dosyalar ve Akışlar ile Çalışmak (Serileştirme ve Ters İşlemi)
12	17.05.2022	Tip dönüşümü, Enum Sınıfları, İç Sınıflar
13	24.05.2022	2. Ara Sınav
14	31.05.2022	Paralel Programlamaya Giriş

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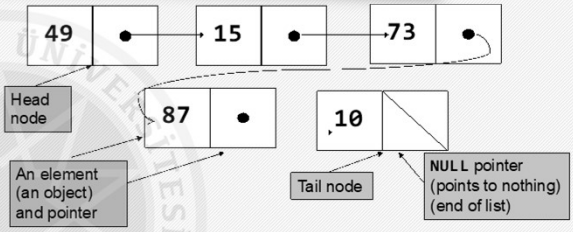
GENERIC CLASSES and DATA STRUCTURES in JAVA

- Generic programming
- LinkedList
  - Self-referential class objects
  - The first (head) and the last (tail) nodes
  - Connected by pointer links
  - Iterator object
- Advantages of linked lists over arrays:
  - Enlarging a list costs nothing!
  - Insertion and removal of elements to any position is faster.
  - Sorting algorithms work faster on linked lists.
- Advantage of arrays over linked lists:
  - Lists are traversed sequentially where any ith member of an array is directly accessible.



GENERIC CLASSES and DATA STRUCTURES in JAVA

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- Types of linked lists:
  - Single-linked list: Only traversed in one direction
  - Doubly-linked list: Allows traversals both forwards and backwards
- A list may also be circular.
  - Pointer in the last node points back to the first node (like prayer beads)
- java.util.ArrayList (single-linked)
  - ArrayList myList = new ArrayList();

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GENERIC CLASSES and DATA STRUCTURES in JAVA

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- Fundamental methods of the ArrayList class:
  - **add**(<T> object): Adds an element (an object of type T) to the end of the list.
  - <T> **get**(int i): Returns the ith element.
  - int **size**( ): Returns the number of elements in this list
- A selection of the other methods of the ArrayList class:
  - **ensureCapacity**(int size): Increases the capacity of this ArrayList instance, if necessary.
  - **trimToSize**( ): Trims the capacity of this ArrayList instance to be the list's current size.
  - **set**(int i, <T> element): Replaces the element at the specified position in this list with the specified element.
  - **remove**(int i): Removes the ith element from this list
  - *If the current size is less than i, an IndexOutOfBoundsException is thrown (unchecked).*

GENERIC CLASSES and DATA STRUCTURES in JAVA

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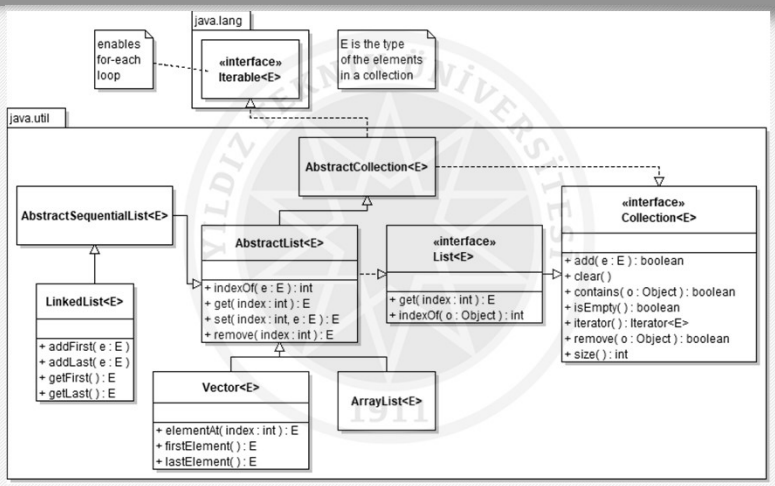

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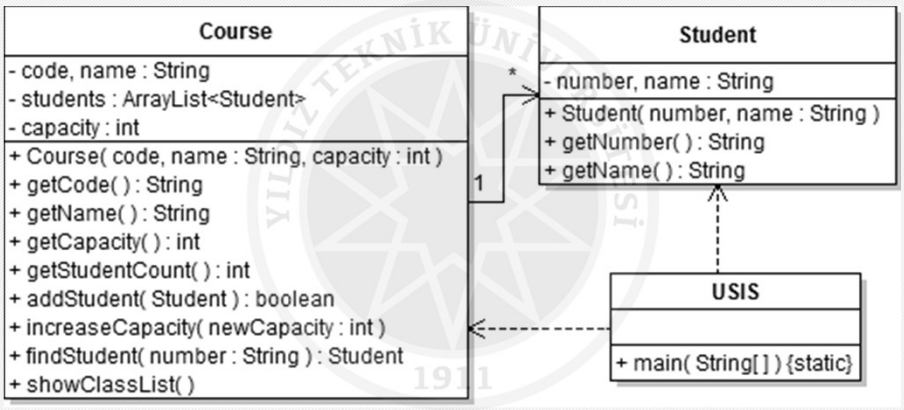
GENERIC CLASSES and DATA STRUCTURES in JAVA



MAP STRUCTURE in JAVA

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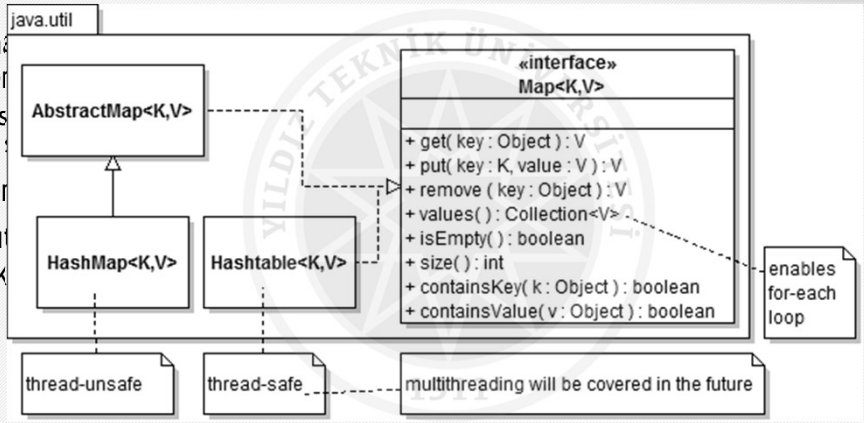

MAP STRUCTURE EXAMPLE in JAVA


```
package nyp10b;
import java.util.*;

public class Course {
    private String code; private String name; private int capacity;
    private HashMap<String,Student> students;

    public Course(String code, String name, int capacity) {
        this.code = code; this.name = name; this.capacity = capacity;
        students = new HashMap<String,Student>();
    }
    public String getCode() { return code; }
    public String getName() { return name; }
    public int getCapacity() { return capacity; }
    public int getStudentCount() {
        return students.size();
    }
    public boolean addStudent( Student aStudent ) {
        if( getStudentCount() == capacity ||
                findStudent(aStudent.getNumber()) != null )
            return false;
        students.put(aStudent.getNumber(), aStudent);
        return true;
    }
```


MAP STRUCTURE EXAMPLE in JAVA (CON'T)


```
    public Student findStudent( String number ) {
        return students.get(number);
    }
    public void increaseCapacity( int newCapacity ) {
        if( newCapacity <= capacity )
            return;
        capacity = newCapacity;
    }
    public void showClassList( ) {
        System.out.println("Class List of "+code+" "+name);
        System.out.println("Student#  Name, Surname");
        System.out.println("--------  ----------------------------");
        for( Student aStudent : students.values() )
            System.out.println(aStudent.getNumber()+
            " " + aStudent.getName());
    }
}
```

SUMMARY OF FUNDAMENTAL DATA STRUCTURE IMPLEMENTATIONS

- java.util.LinkedList<E> implements List<E>
  - Faster insertions and deletions
  - Slower random access
  - Doubly-linked (Can be traversed backwards by obtaining a ListIterator instance [not to be covered?]).
- java.util.ArrayList<E> implements List<E>
  - Slower insertions and deletions
  - Faster random access
- java.util.Vector<E> implements List<E>
  - Similar to ArrayList
  - synchronized = thread-safe
    - Suitable for multi-threaded use, slower in single-threaded use
- java.util.HashMap<K,V> implements Map<K,V>
  - Used for fast searches by a key (indexed)
- java.util.Hashtable<K,V> implements Map<K,V>
  - Similar to HashMap but synchronized
    - Suitable for multi-threaded use, slower in single-threaded use
  - Attention: Lowercase t in class name Hashtable

Sabırla Dinlediğiniz İçin Teşekkürler

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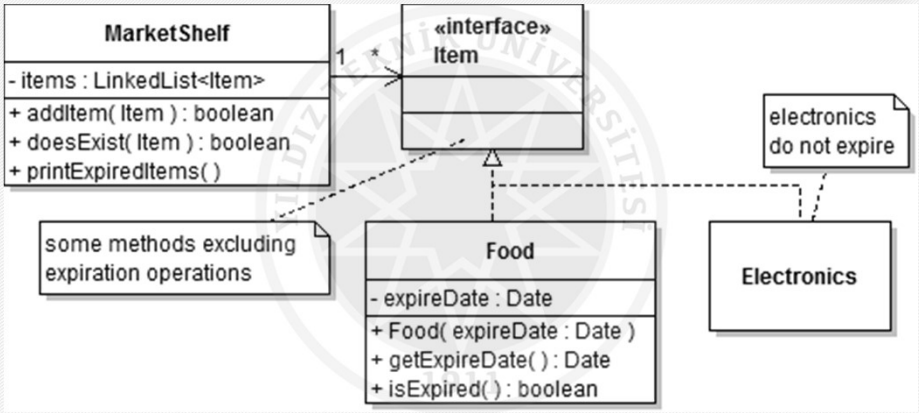
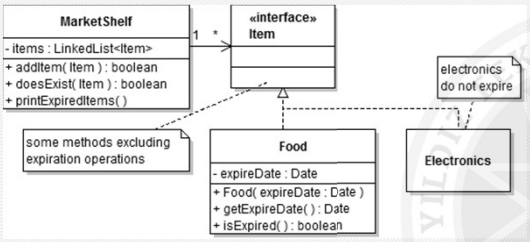
TYPECASTING

- An instance of a sub class can be used wherever an instance of its super class is expected.
  - Type-Safe Operation
- We can convert a specific object to a more general one without loosing any information.
- You can make a manual cast from one type to another, according to the following rules:
  - From the interface to the class of the object
  - From the super class to the sub class

TYPECASTING - EXAMPLE



TYPECASTING – EXAMPLE (CON'T)




```
public void printExpiredItems( ) {
    boolean hasExpiredItem = false;
    System.out.print("Expired item(s): ");
    for( Item item : items )
      if( item instanceof Food )
        if( ((Food)item).isExpired() ) {
          System.out.print(item);
          hasExpiredItem = true;
        }
    if( hasExpiredItem == false )
      System.out.println("All items are fresh!");
  }
  public boolean addItem( Item anItem ) {
    if( doesExist(anItem) )
      return false;
    items.add(anItem);
    return true;
  }
```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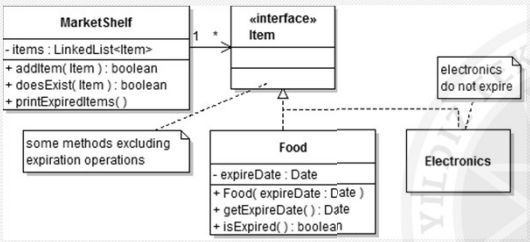


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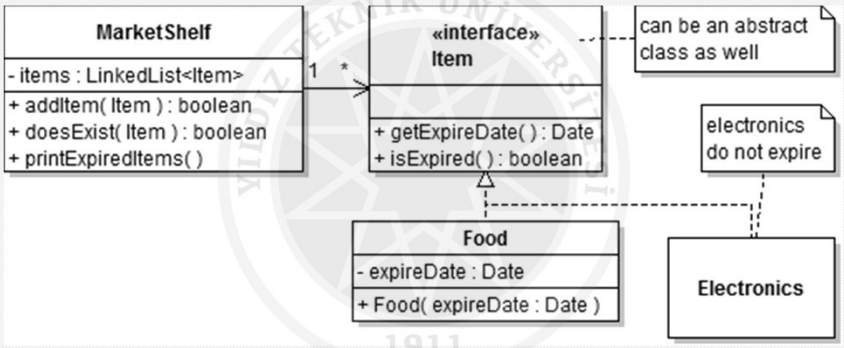

WORKING WITH FILES

- RELATED EXCEPTIONS
  - java.io.IOException: Represents I/O exceptions in general.
  - java.io.EOFException extends IOException: Indicates that the end of file or stream has been reached unexpectedly.
  - java.io.FileNotFoundException extends IOException: Indicates that the requested file cannot be found in the given path.
  - java.lang.SecurityException extends java.lang.RuntimeException: Indicates that the requested operation cannot be executed due to security constraints.
- File operations are separated into two main groups in Java:
  - File management: Operations such as creating, renaming, deleting files and folders.
  - I/O operations.

WORKING WITH FILES - FILE MANAGEMENT

- java.io.File
  - Files
  - Folders
- File(String fileName)
  - fileName should contain both the path and the name of the file/folder.
  - Full path vs. relative path.
- Path separator:
  - Windows uses \ (should be denoted as \\ in Strings), Unix uses /.
  - public static String File.separator
  - public static char File.separatorChar
- File(String path, String name) and File(File path, String name) constructors:

WORKING WITH FILES - FILE MANAGEMENT

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- Some methods of the class java.io.File:
  - boolean exists( ); tells whether the file exists or not.
  - boolean isFile( ); returns true if this File object represents a file, false otherwise, i.e. this object represents a folder.
  - File getParentFile( ); Returns the directory where this file/folder resides.
  - String getCanonicalPath( ) throws IOException; Returns the full path of the file/folder, including the file name.
  - boolean canRead( ); Can this application read form this file?
  - boolean canWrite( ); Can this application write to this file?
  - boolean createNewFile( ); Actually creates the file. Only for files!
  - boolean mkdir( ); Actually creates the folder. Only for folders!
  - boolean mkdirs( ); Actually creates the folder with all necessary parent folders. Only for folders!
  - boolean renameTo(File newName); Renames the file.
  - boolean delete( ); Deletes the file.

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WORKING WITH FILES - I/O OPERATIONS

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- I/O OPERATIONS USING STREAMS
  - Any I/O source is represented as stream in Java
    - Files, memory, command prompt, network, etc.
  - Binary vs. Text format:
    - Binary I/O is fast and efficient, but it is not easily readable by humans.
    - Text I/O is the opposite.
  - Random vs. Sequential access:
    - Sequential access: All records are accessed from the beginning to the end
    - Random access: A particular record can be accessed directly.
    - Disk files are random access, but streams of data from a network are not.

WORKING WITH FILES - I/O OPERATIONS

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- Serialization – Output operations:
  - We will write entire objects to a file on disk.
  - java.io.Serializable
  - ObjectOutputStream and FileOutputStream objects are chained together for serialization.
  - About the transient keyword

WORKING WITH FILES - I/O OPERATIONS

- About the lines beginning with @ :
  - These are special commands called “annotations”.
  - They work at the “meta” level, i.e. they contain “information about information”.
  - They give information to the IDE, compiler, another programme, etc. about this program.
  - We have used the annotation mechanism to remove the warnings.
  - In fact, warnings must be taken into consideration.
  - Example: @SuppressWarnings("serial")

WORKING WITH FILES - I/O OPERATIONS - EXAMPLE

- Kod Gösterimi Yapılsın!

INNER CLASSES

- You can code a class within a class.
  - An inner class is coded within an outer class.
- An inner class can:
  - Access all members of the outer class, including the private ones.
  - Be hidden from other classes of the same package, if defined as private.
  - It is frequently used in form of anonymous inner classes in multithreaded and GUI programming.
    - Anonymous = without a name!
- You cannot:
  - define a static method in a an inner class.

INNER CLASSES - EXAMPLE

- Kod Gösterimi Yapılsın!

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