Assessment 2 : OOP 2003/4

Date set :	4/2/2004
Part One due :	4pm 27/2/2004
Part Two due :	4pm 30/4/2004

Part one of this assessment is worth 20% of your course work mark (15% if you are on the MSc course)
Part two of this assessment is worth 60% of your course work mark (45% if you are on the MSc course)

Your overall task is to design and write a well commented program that uses the oo techniques that you have covered in the oop lectures and tutorials for example inheritance, polymorphism and patterns. This assessment is split into two parts and you should hand in each part separately. The deliverables for each part are listed at the bottom of this document.

The design of the system is to be done in part one of the assignment and will be done in groups of approximately ten. However note carefully that you must submit an individual report for this (see deliverables)

The implementation of the system is to be done in groups of two or three. However note carefully that you must submit an individual report for this with a joint code submission (see deliverables)

The program that you are to design and write should conform to the following specification (you may limit your data to 12 cameras for demonstration purposes).

HappySnapper is a small organisation that sells cameras and camera equipment. As far as cameras are concerned they only sell the following formats: SLRs [Single Lens Reflex] (both digital and 35mm), digital compacts and 35mm rangefinder cameras. In addition to cameras they also sell lenses, filters and other photographic equipment.

HappySnapper want a computer system to store information about the cameras that they sell and the lenses. This system should record the information specified below on disk. It should be capable of retrieving the information and displaying it on the screen. It should also allow new cameras and lenses to be added and removed from the stored information. It should also allow, for cameras with interchangeable lenses, a particular lens to be selected for a camera and display the resulting camera details and the total price. The system should indicate whether the item is in stock or not (**no** stock levels).

When designing the system bear in mind that they may well sell medium format SLRs and TLRs (twin lens reflex) in the future.

They want you to provide a visual computer demonstration of this system. This simulation should provide the features specified above ie allow the storage, retrieval, deletion and display of lenses and cameras (including selected lens where appropriate). NB no images of cameras or lenses are needed for the system.

To help you to design the system you are provided below with additional information about what HappySnapper want recorded for each type of camera and lens that they currently deal with. (Note that this information refers to the camera type not the camera make eg digital compact)

SLRs 35mm

All of these cameras can have interchangeable lenses, though each camera that they sell usually comes with a standard lens (they also sell standard and other lenses separately as detailed below). There are several different lens fittings and the ones dealt with are listed at the end of this section. Each camera has a range of shutter speeds typically 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, /15, 1/8, 1/4, 1/2, 1 (all in seconds). However for the display only the shortest and the longest times are important. In case you look up further information you will find that all SLR cameras have a "Bulb" time setting, which you can ignore. Most cameras have a self timer (so that you can take photographs of yourself :-) Cameras may have automatic focussing (always with manual override) or just manual focussing. Cameras may have fully automatic exposure, semi-automatic or manual (usually fully automatic cameras can be switched to semi-automatic or manual exposure control). Each camera can accommodate a range of film speeds eg 25 to 1600 a.s.a. (American Standards Association). Some cameras have a built in flash and some of these have red-eye reduction. The actual camera settings may be seen in the viewfinder. Some cameras have a power wind on mechanism for the film. The above represents a basic description and there are often other features relating to individual cameras.

SLRs digital

All of these cameras can have interchangeable lenses, though each camera that they sell usually comes with a standard lens (they also sell standard and other lenses separately as detailed below). There are several different lens fittings and the ones dealt with are listed at the end of this section. Each camera has a range of shutter speeds but these are not usually specified. Most cameras have a self timer (so that you can take photographs of yourself :-) Cameras have automatic focussing (always with manual override). Cameras will have fully automatic exposure (usually they have several automatic exposure program modes). Each camera can accommodate a range of memory card sizes. Different ca`meras take different kinds of memory card. They are all supplied with a card initially and depending on the resolution selected the number of images stored varies. Only the minimum and maximum number of images stored on this supplied memory card need be displayed. Each camera has a sensor with a number of effective pixels that can be used. It is important for this to be displayed (eg 4.0M) along with the maximum image resolution (eg 2272 x 1704 pixels). The battery type used should be displayed. Some cameras have a built in flash and some of these have red-eye reduction. The actual camera settings may be seen in the viewfinder. Some cameras have an lcd or tft screen for image display. The above represents a basic description and there are often other features relating to individual cameras.

Digital compacts

These cameras do not have interchangeable lenses, though each camera that they sell usually comes with a zoom lens and may also have a digital zoom facility. Each camera has a range of shutter speeds but these are not usually specified. Most cameras have a self timer (so that you can take photographs of yourself :-) Cameras have

automatic focussing. Cameras will have fully automatic exposure (usually they have several automatic exposure program modes). Each camera can accommodate a range of memory card sizes. Different cameras take different kinds of memory card. They are all supplied with a card initially and depending on the resolution selected the number of images stored varies. Only the minimum and maximum number of images stored on this supplied memory card need be displayed. Each camera has a sensor with a number of effective pixels that can be used. It is important for this to be displayed (eg 4.0M). The battery type used should be displayed. Some cameras have a built in flash and some of these have red-eye reduction. The viewfinders are usually simple optical viewfinders though there is usually an lcd or tft screen for image display and control. The above represents a basic description and there are often other features relating to individual cameras.

35mm rangefinder

All of these cameras can have interchangeable lenses, though each camera that they sell usually comes with a standard lens (they also sell standard and other lenses separately as detailed below). There are several different lens fittings and the ones dealt with are listed at the end of this section. Each camera has a range of shutter speeds typically 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, /15, 1/8, 1/4, 1/2, 1 (all in seconds). However for the display only the shortest and the longest times are important. In case you look up further information you will find that all range finder cameras have a "Bulb" time setting, which you can ignore. Most cameras have a self timer (so that you can take photographs of yourself :-) Cameras may have automatic focussing (always with manual override) or just manual. Cameras may have fully automatic exposure, semi-automatic or manual (usually fully automatic cameras can be switched to semi-automatic or manual exposure control). These cameras may have TTL (through the lens) exposure metering. Each camera can accommodate a range of film speeds eg 25 to 1600 a.s.a. (American Standards Association). Some cameras have a built in flash and some of these have red-eye reduction. The actual camera settings may be seen in the viewfinder. Some cameras have a power wind on mechanism for the film. The above represents a basic description and there are often other features relating to individual cameras.

Lenses

Lenses are specified by their focal length and their largest aperture setting. The focal length is always quoted in mm eg 50mm. The focal length of zoom lenses is specified by their minimum and maximum focal length separated by a dash eg 28-105mm. The aperture of lenses is specified by their f number. The largest aperture should be quoted for non-zoom lenses. The smaller the f number the larger the aperture eg f1.8. Zoom lenses quote a range of largest apertures in a similar way to the way focal lengths are quoted eg f4-5.6.

HappySnapper stock lenses with the following fittings for 35mm SLR cameras

Pentax AF
Pentax K mount

Canon
Nikon
Olympus
Minolta

HappySnapper stock lenses with the following fittings for Digital SLR cameras

Pentax
Canon
Nikon
Minolta

HappySnapper stock lenses with the following fittings for range finder cameras

Leica (at the moment HappySnapper only deal with Leica range finder cameras)

The memory cards for Digital cameras that HappySnapper stock are as follows
compactflash
smartmedia
multimedia
memory stick
xD
secure digital

Some sample camera specifications are given below

Model Pentax MZ-60 35mm SLR
Lens fitting Pentax AF
Shutter speeds 30 – 1/2000
Self Timer
Auto focussing
Fully automatic exposure
Semi-automatic exposure
Manual exposure
Film speeds 25 – 2000 asa
Auto flash with red eye reduction
Power wind on
Mirror lock
Date printing
Lens selected Pen2890SK 28-90mm f3.5-5.6
Price including selected lens £199.00

Model Leica MP 35mm range finder camera
Lens fitting leica
Shutter speeds 2 – 1/2000
Self Timer
Semi-automatic exposure
Manual exposure
Film speeds 25 – 1000 asa

5 year guarantee
Fully mechanical
High contrast viewfinder
Lens selected Carl Zeiss planar 45mm f2
Price including selected lens £2299.00

Model Olympus Mju 400 compact digital camera
Shutter speeds 1 – 1/2000
Self Timer
3x optical zoom
4x digital zoom
4M effective pixels
2272 x 1704 pixel resolution
25 – 100 images on supplied card
Auto focussing
Fully automatic exposure
xD card
lithium-ion battery
Manual exposure
Auto flash with red eye reduction
Movie recording function
Weather-proof metal body
lcd screen
usb connection
Price including lens £349.00

Model Canon EOS 300D digital SLR
Lens fitting canon
Shutter speeds 30 – 1/4000
Self Timer
6.3M effective pixels
3072 x 2048 pixel resolution
30 – 120 images on supplied card
Auto focussing
xD card
lithium-ion battery
Fully automatic exposure

Semi-automatic exposure
Manual exposure
Auto flash with red eye reduction
Power wind on
2.5 fps 4 shot burst
8 white balanced modes
35 AE zones
tft screen
usb connection
Lens selected EFS 18-55mm f3.5-5.6
Price including selected lens £899.00

Deliverables
Part One (One submission per person)

1. A UML class diagram showing your proposed system generated from the discussions that you had within your design group (this may well be the same for all members of the group [though you may choose to use whatever design you wish]).

2. A brief individual description of the functionality to be implemented.

3. An individual report (two pages) outlining what the rationale behind the design you presented is and how the design was arrived at eg you might explain that initially some classes were split but because ….. they were combined or vice-versa.

Part Two (One submission per group for parts 1 and 2, and one per person for part 3)

1. A printed copy of the fully commented program that implements the specified system. Comments should say what is done, what if any oo technique is used and if necessary why something is done. (You may wish to examine javadoc as a tool to document your code)

2. You will need to submit your program electronically as well. Your programs MUST be submitted either on a floppy disc or via email. In either case they should be in a directory whose name should be your surname followed by your initial(s) with no spaces eg smithj. If you submit via email then to do this you must zip the directory up and use the zip file as your attachment. All submissions will be electronically processed by a plagiarism detection program. You must also submit a standard signed assessment submission form. Without this form your work will not be marked.

3. An individual report indicating which classes/parts of the system that each person wrote individually or jointly. Also this report should include an individual assessment of the oo techniques used (maximum two sides)