UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS
Department of Computer Science
and
Information Systems

Assessment Paper

Academic Year: 2006/2007
Module Title: Business Oriented Programming Languages
Duration of Exam: 2.5 hours
Lecturer : Michael Coughlan

Semester: 2
Module Code: CS4556
% of Total Marks: 65%
Paper marked out of : 100

Instructions to Candidates.

Four questions. Attempt **two** questions **only**.

Question 1	COBOL theory	(50 marks)
Question 2	Program Design	(50 marks)
Question 3	Programming	(50 marks)
Question 4	Programming	(50 marks)

Attempt two questions only

Q1 COBOL theory

(a) The problem posed in Question 2 must be solved using a SORT and control-break based solution but when this problem was solved in one of the lab assessments a table-based solution was used. Briefly discuss the advantages and disadvantages of one solution versus the other. (8 marks)

(b) The File Description (FD) entries shown below are for two INDEXED files where AlbumNum-AL is the Primary Key and ArtistNum-AL the Alternate Key of the AlbumFile and where ArtistNum-AR is the Primary key and ArtistName-AR the Alternate Key of the ArtistFile.

Write a code fragment that accepts the Artist's Name from the user and then displays the names of all the albums for that artist. (8 marks)

```
FD AlbumFile.
01 AlbumRec.
   02 AlbumNum-AL       PIC 9(10).
   02 AlbumName-AL      PIC X(50).
   02 ArtistNum-AL      PIC 9(5).

FD ArtistFile.
01 ArtistRec.
   02 ArtistNum-AR      PIC 9(5).
   02 ArtistName-AR     PIC X(60).
```

(c) Briefly explain the purpose of the IS INITIAL phrase when used in the PROGRAM-ID of a subprogram and outline the advantages and disadvantages of its use. (6 marks)

(d) COBOL subprograms have characteristics that limit their effectiveness in creating abstract data types. Briefly and with the use of some small examples describe these characteristics. (6 marks)

(e) Define the terms "vertical software market" and "horizontal software market" and briefly describe the characteristic differences between the applications that operate in each of these software markets. (6 marks)

(f) What is meant by the term "Hit Rate". Briefly comment on the effect a projected high hit or low hit rate would have on your choice of file organization. (4 marks)

(g) What is the purpose of the FILE STATUS clause when used in a file's SELECT and ASSIGN clause? (4 marks)

(h) Referring to the data descriptions show below write a program fragment which accepts a search term from the user and then uses the INSPECT and Reference Modification to discover, and display, how many times the search term appears in the email text.

Note that the INSPECT only finds exact word matches. The word "cat" entered as a search term will not match directly with the word "cat" in the email text because the SearchTerm variable is 15 characters long and "cat" is actually held as "cat----------" (where "–" represents a space). (8 marks)

```
01 EmailText            PIC X(1000).
01 SearchTerm           PIC X(15).
01 WordCount            PIC 999.
```

Q2 Program Design

A program is required that will use the CAO Applications file to produce a summary file that shows the number of preferences of each type (first, second, third etc) achieved by UL courses. The summary file must be ordered on ascending Course Code.

The **CAO Applications file** is a sequential file ordered on ascending CAO-Number. It contains applicant details. The courses that the applicant applies for are held in a 10 element table. The first element of the table contains the first preference, the second the second preference and so on.
Note that the first two characters of the Course-Code represent the institution. All UL courses are prefixed by the LM code.

Field	Type	Length	Occurrence	Value
CAO-Number	X	8	1	-
Applicant-Name	X	60	1	-
Pref-Course-Code	X	5	10	e.g LM051

The **Summary file** is a sequential file ordered on ascending Course Code. It contains a record for each UL course for which applicants have expressed a preference. Each record in the file has the following description:

Field	Type	Length	Occurrence	Value
Course-Code	X	5	1	e.g LM051
Course-Title	X	55	1	-
Pref-Count	N	4	10	0-9999

The Course-Title in the Summary file is obtained from a **Course Title file**. This is a sequential file ordered on ascending Course-Code. It contains a record for each UL course. Each record in the file has the following description.

Field	Type	Length	Occurrence	Value
Course-Code	X	5	1	e.g LM051
Course-Title	X	55	1	-

In a previous assessment this problem was solved using a table based approach. In this instance you are **required to design a program uses a SORT and control-break based solution**. The SORT should have an INPUT PROCEDURE to break the preferences table elements in the Application Record into individual records and should have an OUTPUT PROCEDURE to process the sorted records.

Draw a Program Structure Diagram representing your solution to the problem, write out the iteration and selection conditions required, then populate your diagram with the conditions you have devised and with the operations given on the next page.

Marks will be apportioned as follows;

a) Create Program Structure Diagram (24 marks)
b) Write Iteration and Selection conditions (8 marks)
c) Assign Iteration and Selection conditions and the supplied executable operations to the diagram (18 marks)

Some Data Items

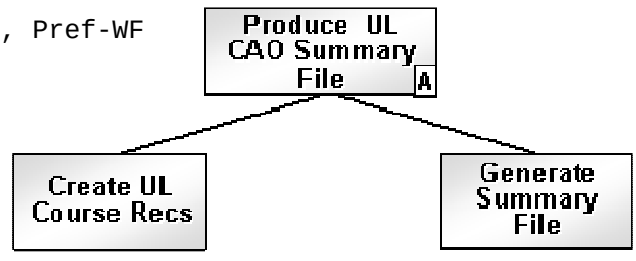
```
DATA DIVISION.
FILE SECTION.
FD ApplicationsFile.
01 ApplicationRec.
   02 FILLER              PIC X(68).
      88  EndOfApplicationsFile VALUE  HIGH-VALUES.
   02 CourseCode-AF OCCURS 10 TIMES.
      03 FILLER           PIC XX.
         88 ULCourse VALUE "LM".
      03 FILLER           PIC X(3).

FD SummaryFile.
01 SummaryRec.
   02 CourseCode-SF       PIC X(5).
   02 Preferences-SF.
      03  PrefCount-SF OCCURS 10 TIMES  PIC 9(4).

SD WorkFile.
01 WorkRec.
   02 CourseCode-WF       PIC X(5).
      88 EndOfWorkFile    VALUE HIGH-VALUES.
   02 Pref-WF             PIC 99.

FD TitleFile.
01 TitleRec.
   88 EndOfTitleFile     VALUE High-Values.
   02 CourseCode          PIC X(5).
   02 CourseTitle         PIC X(55).
```

Executable Operations

```
01  WRITE SummaryRec
02  OUTPUT SummaryFile
03  CLOSE SummaryFile
04  MOVE CourseCode-WF  TO CourseCode-SF
05  MOVE CourseTitle-TF TO CourseTitle-SF
06  ADD 1 TO PrefCount-SF(Pref-WF)
07  RETURN WorkFile
          AT END SET EndOfWorkFile TO TRUE
    END-RETURN
08  READ TitleFile
        AT END SET EndOfTitleFile TO TRUE
    END-READ
09  OPEN INPUT TitleFile
10  CLOSE TitleFile
11  MOVE ZEROS TO  Preferences-SF
12  MOVE Pref-WF TO Prev-Pref
13  MOVE CourseCode-AF(Cidx) TO CourseCode-WF
14  MOVE Cidx TO Pref-WF
15  RELEASE WorkRec
16  READ ApplicationsFile
       AT END SET EndOfApplicationsFile TO TRUE
    END-READ
17  OPEN INPUT ApplicationsFile
18  CLOSE ApplicationsFile
```

First Condition and start of PSD

```
A.  SORT WorkFile ON ASCENDING KEY CourseCode-WF, Pref-WF
       INPUT PROCEDURE IS CreateULCourseRecs
       OUTPUT PROCEDURE IS GenerateSummaryFile.
```



Q3 Programming

A program is required that will update the Student file with the student's Zodiac sign to produce an Updated Student file and will display the count of the number of male students and female students born in each house of the Zodiac (Aries, Taurus, Gemini etc.).

The Student file is a sequential file held in ascending StudentId order. Each record of the Student file contains the following items;

FIELD	TYPE	LENGTH	VALUE
Student Id	9	7	0-9999999
Student Name	X	30	-
DateOfBirth	X	8	DDMMYYYY
Gender	X	1	M/F

The updated student file is file is a sequential file held in ascending StudentId order. Each record in the file contains the following items;

FIELD	TYPE	LENGTH	VALUE
Student Id	9	7	0-9999999
Student Name	X	30	-
DateOfBirth	X	8	DDMMYYYY
ZodiacSign	X	11	-
Gender	X	1	M/F

An example of the expected screen output is shown below. A table showing the SignName, and the StartDate and EndDate of each sign is also given.

Example Screen Output

```
SignName     Males  Females
Aries           50       34
Taurus         150      123
Gemini          75       89
Cancer          94      127
Leo             23       23
Virgo           45       34
Libra           33       46
Scorpio         23       67
Sagittarius     56       60
Capricorn       88       93
Aquarius       102       87
Pisces          44       74
```

The Zodiac Table

SignName	StartDate	EndDate
Aquarius	01-21	02-19
Pisces	02-20	03-20
Aries	03-21	04-20
Taurus	04-21	05-21
Gemini	05-22	06-21
Cancer	06-22	07-22
Leo	07-23	08-21
Virgo	08-22	09-23
Libra	09-24	10-23
Scorpio	10-24	11-22
Sagittarius	11-23	12-22
Capricorn	12-23	01-20

A Contained Subprogram called "IdentifySign" should be written to identify the Zodiac sign for a given birth date. The subprogram should take the DateOfBirth as an input parameter and should return the SignName as its return/output parameter.

Marks for the solution will be allocated as follows –

a) Data declarations (including tables) (10 marks)
b) Sub-program (13 marks)
c) Calling sub-program (3 marks)
d) Accumulating Zodiac sign totals (10 marks)
e) Format & display accumulated results (5 marks)
f) Processing Input file records (6 marks)
g) Producing Output file records (3 marks)

Q4 Programming

Write a program which processes the Apogee Manufacturing Stock and Manufacturer files to create an Orders file containing ordering information for all stock items that need to be re-ordered (i.e. where the QtyInStock is less than the ReorderLevel and the OnOrder flag has not been set). For each stock item that needs to be re-ordered the program should create a record in the Orders file and should set an ONORDER flag in the Stock file record.

Apogee Manufacturing tries to pay all suppliers in EU countries in advance. For these countries, the CostOfItems of each Orders file record must be calculated.

Orders file (Sequential).

FIELD	TYPE	LENGTH	VALUES
ITEMDESCRIPTION	X	30	-
MANFNAME	X	30	-
QTYREQUIRED	9	6	1 - 999999
COSTOFITEMS	9	7	0.00 - 99999.99

The CostOfItems is zero for all non EU countries.
The QtyRequired is obtained from the ReorderQty field in the Stock File.
The CostOfItems is the QtyRequired multiplied by the ItemCost.

Stock File (Relative).

FIELD	TYPE	LENGTH	VALUES
STOCKNUMBER	9	5	10001 - 99999
MANFCODE	X	4	AAAA-ZZZZ
ITEMDESCRIPTION	X	30	-
QTYINSTOCK	9	6	1 - 999999
REORDERLEVEL	9	3	1 - 999
REORDERQTY	9	6	1 - 999999
ITEMCOST	9	5	0.00- 999.99
ONORDER	X	1	Y/N

Note: The relative record key is obtained by subtracting 10000 from the StockNumber.

Manufacturer File (Indexed)

FIELD	KEY	TYPE	LENGTH	VALUES
MANFCODE	Primary	X	4	AAAA-ZZZZ
MANFNAME	ALT with Duplicates	X	30	-
MANFADDRESS	-	X	70	-

Note: The constituent parts of the address are separated by commas, with the country name coming last. Each constituent part of the address will immediately follow its preceding comma.

EU countries

Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

Marks for the solution will be allocated as follows –

a) File & Record declarations (8 marks)
b) Identify Stock file items to be re-ordered (11 marks)
c) Get corresponding Manufacturer information (7 marks)
d) Extract country name from address (7 marks)
e) Create and write the Orders file records (11 marks)
f) Updates the Stock file OnOrder flag (6 marks)