

University of Dublin

Trinity College

Faculty of Engineering and Systems Sciences
Department of Computer Science

BA (Information and Communications Technology)
Foundation Scholarship Examination

Computer Science and Information Management – Practical

Wednesday, March 29th 2000

ICT Lab

2:00 - 5:00

Mr. John Carney, Mr. Hugh McCabe, Dr. Lucy Hederman,
Mr. Arthur P. Hughes and Ms. Mary Sharp

Attempt all questions.

Answers may be presented in computer files or in Examination Booklets or a combination of both.

Please save computer files to disk regularly. Drop a copy of all computer files into the submit folder BAICT/SCHOL/2ICT3 at the end of the examination. After submitting and before closing files, ask an invigilator to verify the submission.

Resources provided: Mathematica, MS Access, MS Excel, Java Workshop, Visual J++, WWW. This examination is open book. The use of textbooks, Java Workshop and its help files, GUI libraries and the other resources provided is allowed and encouraged.

1. (a) Design and implement a Microsoft Access database for the data described below. Provide views (i.e. queries) on the database which
 - (i) list all call details ordered by number called
 - (ii) for each call purpose type give the number of calls and average duration.(35 marks)

- (b) Statistically analyse the sample data shown in Figure 1 attached. A copy of the sample data is provided at

http://www.cs.tcd.ie/courses/baict/handbook/exam_papers/sf/schol/2000/ICT2+3-Pr_00_Files/ICT2+3_Pr_Data_00.doc

(15 marks)

(Total 50 marks)

Description of Mobile Phone Usage Survey Data

A survey of TCD student's mobile phone usage has provided data for analysis. Table 1 on the attached sheet provides a small sample of the data as currently recorded. The survey includes only people with a mobile phone, and assumes that nobody has more than one mobile phone account. For each survey subject we record their sex, the faculty they are in (both a faculty code number and the full name of the faculty are listed), the year they are in (or PG for post-graduates), the (possibly many) mobile phone services they subscribe to, and the operator (one per subject) of those services.

Each subject provided details of one month's calls including date, time, duration (in seconds) and number called. The weekday of each date is recorded in the table. The identity of the called person or business was ascertained, either by phoning the number or asking the caller. The survey subject was then asked the relationship (if any) of the called person, and the purpose of the call. The purpose was classified using the following categories - social, logistics, chat, study, work, club, info-seeking, other.

While a proper survey would aim to survey a random sample of unconnected people, in designing your database, you should assume that the subjects form a community who phone each other's friends and relations (see sample data).

2. Consider the following one-player game:

It is played on a rectangular board and the object of the game is for the player to push pieces from various positions on the board to pre-designated destinations. Some squares on the board are coloured black, which indicates that no pieces can move to these squares. The difficulty is that the player can only move pieces by pushing them with his/her own piece and hence if he/she pushes a piece into a corner it will not be retrievable.

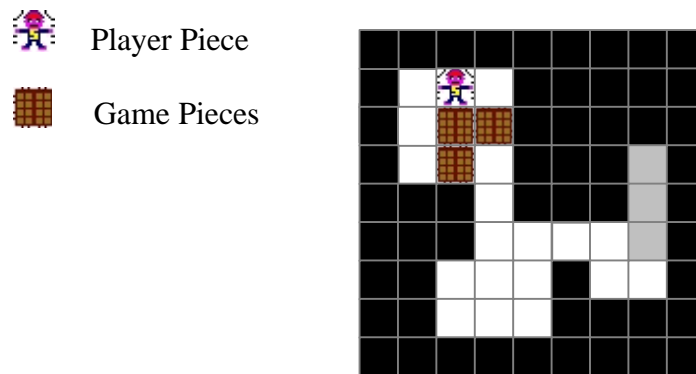


Fig. 1

The rules of the game are simple:

- ◆ The game is played on a rectangular grid of squares.
- ◆ Each square is either black, white, or grey.
- ◆ The game starts with a *player piece* and one or more *game pieces* positioned on white squares.
- ◆ The player piece can be moved one square at a time, horizontally or vertically.
- ◆ The player piece cannot be moved to black squares.
- ◆ The player can move an adjacent game piece by pushing it. The result of a push is that the player piece and the game piece are each moved one square in the direction of the push.
- ◆ It is not possible to push more than one game piece at a time.
- ◆ Game pieces can only be moved by pushing them with the player piece and cannot be pushed onto black squares.
- ◆ The game is completed when all the game pieces are positioned on grey squares.

Design and implement a system in Java which will allow the user to play this game. The system should include a GUI which displays the current state of the board and allows the user to move the player piece. The system should indicate if and when the game is completed, keep a count of how many moves have been made, and allow the user to undo moves. The system should use the board layout suggested in Fig.1. Suitable icons and some sample code can be found at:

http://www.cs.tcd.ie/courses/baict/handbook/exam_papers/sf/schol/2000/ICT2+3-Pr_00_Files/ICT2+3_game.html

(50 marks)

Survey ID	Sex	FCode	Faculty	Year	Operator	Services	Number Called	Date	Day	Time (H:M)	Duration (secs)	CalledSubscriber Name	Relationship	Call Purpose
12	M	1	Engineering	JF	Eircell	ReadytoGo	087-231456	8/1/00	Sat	10:20	1042	John Smith	Brother	chat
							087-231456	9/1/00	Sun	20:34	131	John Smith	Brother	logistics
							01-6680889	10/1/00	Mon	1:34	354	Ann Moore	Friend	chat
57	F	2	Arts (Letters)	SF	Digifone	Select 1, Weekender Plus	01-6082254	8/1/00	Sat	20:46	243	PB Bus Co		info
							021-34567	10/1/00	Mon	20:55	54	Mary Quinn	Captain	club
							01-6083456	10/1/00	Mon	21:02	805	Brian Kelly	Father	chat
							01-6083456	11/1/00	Tue	13:21	89	Brian Kelly	Father	logistics
69	F	2	Arts (Letters)	SS	Eircell	Eirtime 50, EirOffice	087-231456	8/1/00	Sat	8:12	74	John Smith	Classmate	study
							086-123456	9/1/00	Sun	20:23	136	Ann Moore	Sister	logistics
							086-123456	11/1/00	Tue	22:31	646	Ann Moore	Sister	chat
							01-6082254	11/1/00	Tue	22:43	154	PB Bus Co		info
77	M	3	Science	SF	Digifone	Select 2	086-123456	10/1/00	Mon	0:15	32	Ann Moore	Classmate	logistics
							021-34567	10/1/00	Mon	0:17	83	Mary Quinn	Captain	club
							01-6082254	10/1/00	Mon	14:12	157	PB Bus Co		info
							021-34567	11/1/00	Tue	19:34	97	Mary Quinn	Captain	club
79	F	1	Engineering	P G	Digifone	Speakeasy	01-6680889	9/1/00	Sun	13:52	1245	Ann Moore	Friend	chat
							01-6083456	10/1/00	Mon	9:16	186	Brian Kelly	Boss	work

Figure 1: Small subset of mobile phone usage survey data.