

BLG411E - Software Engineering
Midterm Exam - 17.11.2009

- Books/notes closed • Calculator and dictionary allowed
- Exam duration 1.5 hours
- Write your answers on blank Answer Sheets only

PROBLEM (70 points)

A company needs a Fair Management System (Fuar Yönetim Sistemi). The system will keep information about fair events, and clients (renters) which participate in the fairs. It will track all renting operations, and will produce necessary reports. The following information will be stored on the system:

FAIRS: Fair number, name, location, theme, start date, end date, unit price of space (TL/ m²), total space (m²).

CLIENTS: Client number, name, address, phone.

RENTINGS: Fair number, Client number, Allocated section number, space rented (m²).

The project will contain two sub-projects.

Sub-Project1: Menu-driven Desktop Software

It will be implemented in Visual Basic language, with the following user interface requirements.

- Add/delete/update fairs, clients, rentings.
- Print a “payment receipt” for a specified client’s renting.
- Get a list of all fairs between two specified dates.
- Get a list of all clients participated in a specified fair.
- Get a list of rentings for a specified client.
- Print “address labels” that will be used to send invitations via mail to all clients in the database.
- Print “ID badge cards” for clients that will participate in a specified fair.
- Summary query: Calculate and display the percentage of available empty space in a specified fair.
- Warning message: If all spaces in a fair are already rented, then no more rentings should be allowed.

Sub-Project2: Web Browsing Software

It will be implemented in ASP language, with the following user interface requirements.

- Display a clickable list of all fairs between two specified dates.
- When the user clicks a fair in the output list, then a clickable list of all clients participated in that fair should be displayed.
- Finally, when the user clicks a client in the output list, then a list of rentings for that client should be displayed.

Question 1) [70 points]

- a) [15 points] Using the Adjusted Function Points method, estimate the Lines of Codes for each sub-project. (Visual Basic : 50 LOC/FP, ASP : 70 LOC/FP).
- b) [15 points] Using the COCOMO II Early Design Model, estimate the total effort and the total development time. (Note that Unadjusted FP should be used in the Early Design Model.)
- c) [15 points] Draw Entity-Relationship Diagram (ERD).
- d) [15 points] Draw Level-1 Data Flow Diagrams (DFD).
- e) [10 points] Draw Hierarchical Structure Charts.

TEST QUESTIONS (30 points)

1) Which of the followings is not included in a Project Plan?

- a. Design review
- b. Life cycle model
- c. Risk management
- d. Phases and milestones

- 2) Which of the followings is true about Configuration Management (CM)?
- CM and Version Control are the same.
 - CM combines procedures and tools to manage different versions of objects.
 - CM allows a user to specify alternative configurations.
 - All of the above
- 3) The linear sequential model of software development is
- A good approach when a working program is required quickly.
 - The best approach to use for projects with large development teams.
 - An old fashioned model that is rarely used any more.
 - A reasonable approach when requirements are well defined.
- 4) Effective software project management focuses on
- people, performance, payoff, product
 - people,product, performance, process
 - people, product, process, project
 - people,process, payoff, product
- 5) The first step in project planning is to
- determine the budget.
 - establish the objectives and scope.
 - select a team organizational model.
 - determine the project constraints.
- 6) Which factor is the least important when choosing the organizational structure for a software team?
- size of the project budget
 - degree of communication desired
 - predicted size of the resulting program
 - rigidity of the delivery date
- 7) Which of these software characteristics are used to determine the scope of a software project?
- context, lines of code, function
 - context, function, communication requirements
 - information objectives, function, performance
 - communications requirements, performance, information objectives
- 8) Which of the following provide useful measures of software quality?
- correctness, maintainability, integrity, usability
 - correctness, performance, integrity, usability
 - reliability, maintainability, integrity, sales
 - correctness, maintainability, size, satisfaction
- 9) The project scope is defined as a means of bounding the system
- Staffing and skills
 - Costs and resources
 - Schedule and milestones
 - Functionality and performance
- 10) Software feasibility is based on which of the following
- business and marketing concerns
 - scope,constraints, market
 - technology, finance, time, resources
 - technical skill of the developers
- 11) The number of people required for a software project is determined
- after an estimate of the development effort is made.
 - by the size of the project budget.
 - from an assessment of the technical complexity of the system.

d. all of the above

12) A weakness of the automated estimation tools is the

- a. high cost of acquisition and use
- b. significant differences between tool estimates and actual values on several projects
- c. inability of these tools to take software reuse into account when making an estimate
- d. inability to integrate LOC and FP data

13) Which configuration objects would not typically be found in the project repository?

- a. design specification
- b. marketing data
- c. source code
- d. test plans

14) The state transition diagram

- a. depicts relationships between data objects
- b. depicts functions that transform the data flow
- c. indicates how data are transformed by the system
- d. indicates system reactions to external events

15) The relationships shown in a data model must be classified to show their

- a. Width and depth
- b. Directionality and reliability
- c. cardinality and modality
- d. probability and risk

16) Control flow diagrams are

- a. needed to model event driven systems.
- b. required for all systems.
- c. used in place of data flow diagrams.
- d. useful for modeling user interfaces

17) The data dictionary contains descriptions of each software

- a. configuration item
- b. data object
- c. diagram
- d. notation

18) Which of the following is not an area of concern in the design model?

- a. architecture
- b. data
- c. interfaces
- d. project scope

19) The reason it is a mistake to do component level design before data design is that

- a. component design is language dependent and data design is not.
- b. data design is easier to do.
- c. the structure of the data usually affects the way in which component-level design is conducted.
- d. data design is hard to do.

20) A necessary supplement to a complete architectural design is

- a. entity relationship diagrams
- b. the data dictionary
- c. test cases for each module
- d. processing narratives for each module

Unadjusted Function Points

Type of Component	Complexity of Components		
	Low	Average	High
External Inputs (EI)	3	4	6
External Outputs (EO)	4	5	7
External Inquiries (EQ)	3	4	6
Internal Logical Files (ILF)	7	10	15
External Interface Files (EIF)	5	7	10

General System Characteristics (GSC)

1. Data Communication	No influence	0
2. Distributed data processing	Incidental	1
3. Performance	Moderate	2
4. Heavily used configuration	Average	3
5. Transaction rate	Significant	4
6. Online data entry	Essential	5
7. End user efficiency		
8. Online update		
9. Complex processing		
10. Reusability		
11. Installation ease		
12. Operational ease		
13. Multiple sites		
14. Facilitate change		

$$\text{Adjusted FP} = (\text{Unadjusted FP}) * \text{VAF}$$

VAF: Value Adjustment Factor

$$\text{VAF} = \left(\sum_{i=1}^{14} \text{GSC}_i * 0.01 \right) + 0.65$$

COCOMO II Early Design Model

$$\text{PM} = A * (\text{KLOC})^E * \prod_{j=1}^7 \text{EM}_j$$

$$E = B + 0.01 * \sum_{j=1}^5 \text{SF}_j$$

$$\text{TDEV} = C * (\text{PM})^F \quad F = D + 0.2 * (E - B) \quad A = 2.94 \quad B = 0.91 \quad C = 3.67 \quad D = 0.28$$

Effort Multipliers (EM)

	Cost Driver	Extra Low	Very Low	Low	Nominal	High	Very High	Extra High
1	PERS	2.12	1.62	1.26	1.00	0.83	0.63	0.50
2	RCPX	0.49	0.60	0.83	1.00	1.33	1.91	2.72
3	RUSE	-	-	0.95	1.00	1.07	1.15	1.24
4	PDIF	-	-	0.87	1.00	1.29	1.81	2.61
5	PREX	1.59	1.33	1.12	1.00	0.87	0.74	0.62
6	FCIL	1.43	1.30	1.10	1.00	0.87	0.73	0.62
7	SCED	-	1.43	1.14	1.00	1.00	1.00	-

PERS - Personnel capability RCPX - Product reliability and complexity
 RUSE - The reuse required PDIF - Platform difficulty PREX - Personnel experience
 FCIL - The team support facilities SCED - Required schedule

Scale Factors (SF)

	Scale Factors	Very Low	Low	Nominal	High	Very High	Extra High
1	PREC	6.20	4.96	3.72	2.48	1.24	0.00
2	FLEX	5.07	4.05	3.04	2.03	1.01	0.00
3	RESL	7.07	5.65	4.24	2.83	1.41	0.00
4	TEAM	5.48	4.38	3.29	2.19	1.10	0.00
5	PMAT	7.80	6.24	4.68	3.12	1.56	0.00

PREC - Precedentedness FLEX - Development flexibility
 RESL - Architecture and risk resolution TEAM - Team cohesion PMAT - Process maturity