

**BLG411E - Software Engineering**  
**Midterm Exam - 17.11.2009 (KEYS)**

**Q1 a) [15 points]**

## Sub-Project1: Menu-driven Desktop Software

### External Inputs (EI): (Total=6)

- Add/delete/update screen (common) for fairs
- Add/delete/update screen for clients and rentings
- Getting two specified dates for listing
- Getting a specified fair's name for listing
- Getting a specified client's name for listing
- Menu selection

### External Outputs (EO): (Total=7)

- List of all fairs between two specified dates
- List of all clients participated in a specified fair
- List of rentings for a specified client
- Payment receipt
- Address labels
- ID badge cards
- Warning message

### External Inquiries (EQ): (Total=1)

- Output screen of the Summary Query

### Internal Logical Files (ILF): (Total=3)

- FAIRS table
- CLIENTS table
- RENTINGS table

### **Unadjusted FP**

Type of Component	Count	Average Weight	Total
External Inputs (EI)	6	x 4	24
External Outputs (EO)	7	x 5	35
External Inquiries (EQ)	1	x 4	4
Internal Logical Files (ILF)	3	x 10	30
External Interface Files (EIF)	0	x 7	0

TOTAL= 93

## General System Characteristics (GSC) of Sub-Project1

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

Total = 42

VAF: Value Adjustment Factor

$$\begin{aligned}
 \text{VAF} &= \left( \sum_{i=1}^{14} \text{GSC}_i * 0.01 \right) + 0.65 \\
 &= (42 * 0.01) + 0.65 \\
 &= 1.07
 \end{aligned}$$

Adjusted FP = (Unadjusted FP) \* VAF

$$= 93 * 1.07$$

$$\approx 100$$

$\text{LOC}_1 = 100 \text{ AFP} * 50 \text{ LOC/FP}$   
 $= 5000 \text{ lines of code (in VB language)}$

$$\text{KLOC}_1 \approx 5$$

## Sub-Project2: Web Browsing Software

### External Inputs (EI): (Total=3)

- Getting two specified dates for listing
- Getting a specified fair's number from the clickable list
- Getting a specified client's number from the clickable list

### External Outputs (EO): (Total=3)

- Clickable list of all fairs between two specified dates
- Clickable list of all clients participated in a fair
- List of rentings for a client

### Internal Logical Files (ILF): (Total=3)

- FAIRS table
- CLIENTS table
- RENTINGS table

### **Unadjusted FP**

Type of Component	Count	Average Weight	Total
External Inputs (EI)	3	x 4	12
External Outputs (EO)	3	x 5	15
External Inquiries (EQ)	0	x 4	0
Internal Logical Files (ILF)	3	x 10	30
External Interface Files (EIF)	0	x 7	0

TOTAL= 57

## General System Characteristics (GSC) of Sub-Project2

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

Total = 43

VAF: Value Adjustment Factor

$$\begin{aligned}
 \text{VAF} &= \left( \sum_{i=1}^{14} \text{GSC}_i * 0.01 \right) + 0.65 \\
 &= (43 * 0.01) + 0.65 \\
 &= 1.08
 \end{aligned}$$

Adjusted FP = (Unadjusted FP) \* VAF

$$= 57 * 1.08$$

$$\approx 62$$

$\text{LOC}_2 = 62 \text{ AFP} * 70 \text{ LOC/FP}$   
 $= 4340 \text{ lines of code (in ASP language)}$

$$\text{KLOC}_2 \approx 4.3$$

Q1 b) [15 points]

### COCOMO II Early Design Model Effort Multipliers

	Cost Driver	Our Estimate
1	PERS (Personnel capability)	High (0.83)
2	RCPX (Product reliability and complexity)	Nominal (1.00)
3	RUSE (The reuse required)	Low (0.95)
4	PDIF (Platform difficulty)	Low (0.87)
5	PREX (Personnel experience)	Very Low (1.33)
6	FCIL (The team support facilities)	Low (1.10)
7	SCED (Required schedule)	Nominal (1.00)

$$\prod_{j=1}^7 EM_j = 1.004$$

### COCOMO II Scale Factors

	Scale Factors	Our Estimate
1	<b>PREC</b> (Precedentedness)	Nominal - somewhat unprecedented (3.72)
2	<b>FLEX</b> (Development Flexibility)	High - general conformity (2.03)
3	<b>RESL</b> (Architecture/Risk Resolution)	Nominal - often (60%) (4.24)
4	<b>TEAM</b> (Team Cohesion)	Very High - Highly cooperative (1.10)
5	<b>PMAT</b> (Process Maturity)	Low - CMM Level 1 (upper half) (6.24)

$$\sum_{j=1}^5 SF_j = 17.33$$

$$E = B + 0.01 * \sum_{j=1}^5 SF_j = 0.91 + 0.01 * 17.33 = 1.0833 \text{ (Exponent)}$$

$$F = D + 0.2 * (E - B) = 0.28 + 0.2 * (1.0833 - 0.91) = 0.3147 \text{ (Exponent)}$$

$$LOC_1 = 93 \text{ UFP} * 50 \text{ LOC/FP}$$

= 4650 lines of code (in VB language)

$$KLOC_1 \approx 4.7$$

$$LOC_2 = 57 \text{ UFP} * 70 \text{ LOC/FP}$$

= 3990 lines of code (in ASP language)

$$KLOC_2 \approx 4$$

### SOLUTION METHOD #1:

$$\text{Total KLOC} = \text{KLOC}_1 + \text{KLOC}_2 = 4.7 + 4 = 8.7$$

$$\text{PM} = A * (\text{KLOC})^E * \prod_{j=1}^7 \text{EM}_j = 2.94 * (8.7)^{1.0833} * 1.004 = 30.7 \cong 31$$

$$\text{TDEV} = C * (\text{PM})^F = 3.67 * (31)^{0.3147} = 10.8 \cong 11$$

$$\text{Number of people} = \text{PM} / \text{TDEV} = 31 / 11 = 2.8 \approx 3$$

### SOLUTION METHOD #2:

$$\text{PM}_1 = A * (\text{KLOC}_1)^E * \prod_{j=1}^7 \text{EM}_j = 2.94 * (4.7)^{1.0833} * 1.004 = 13.9 \cong 14$$

$$\text{TDEV}_1 = C * (\text{PM}_1)^F = 3.67 * (14)^{0.3147} = 8.4$$

$$\text{PM}_2 = A * (\text{KLOC}_2)^E * \prod_{j=1}^7 \text{EM}_j = 2.94 * (4)^{1.0833} * 1.004 = 13.2 \cong 13$$

$$\text{TDEV}_2 = C * (\text{PM}_2)^F = 3.67 * (13)^{0.3147} \cong 8$$

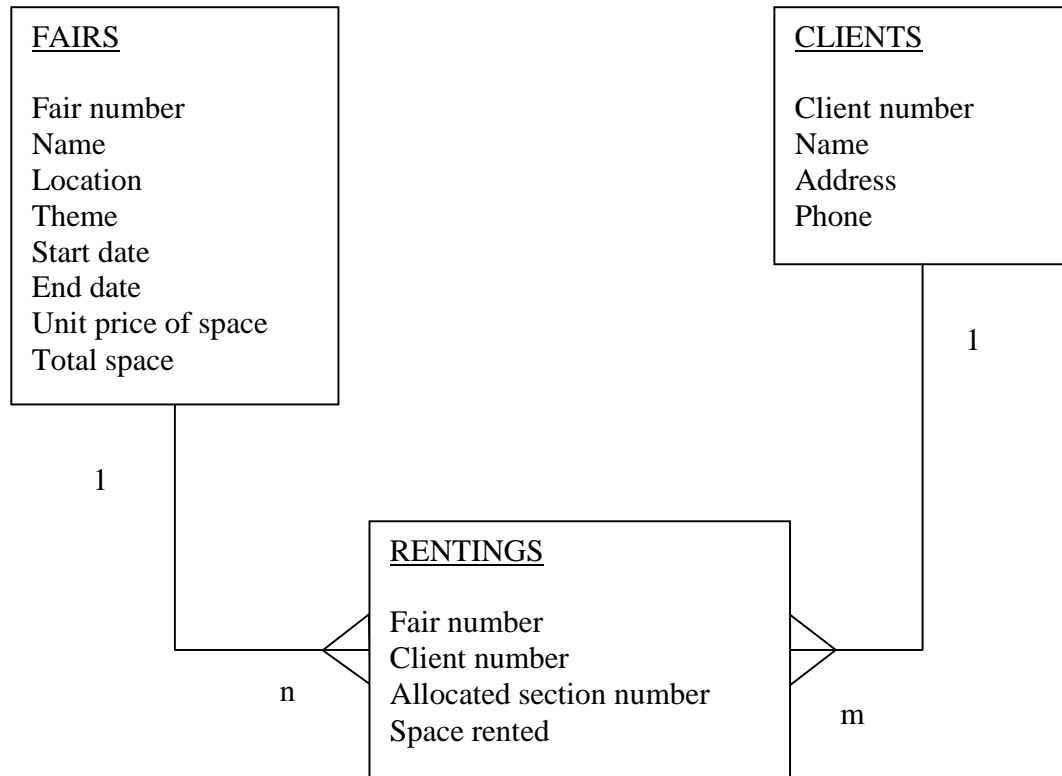
$$\text{Total PM} = \text{PM}_1 + \text{PM}_2 = 14 + 13 = 27$$

$$\text{Total TDEV} = \text{TDEV}_1 + \text{TDEV}_2 = 8.4 + 8 = 16.4$$

$$\text{Number of people} = \text{PM} / \text{TDEV} = 27 / 16.4 = 1.6 \approx 2$$

Q1 c) [15 points]

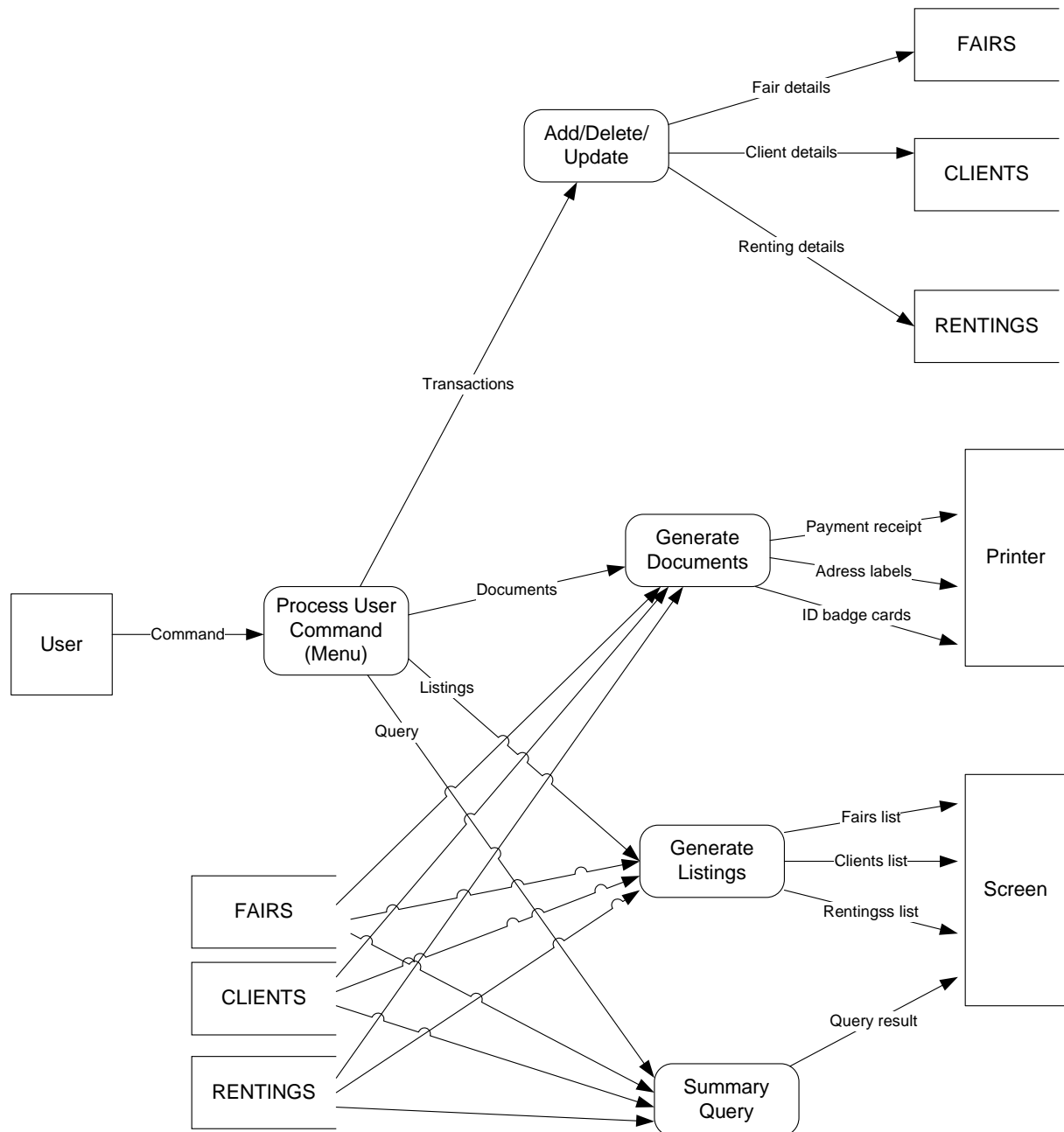
**Entity-Relationship Diagram (ERD)**



Q1 d) [15 points]

## Sub-Project1: Menu-driven Desktop Software

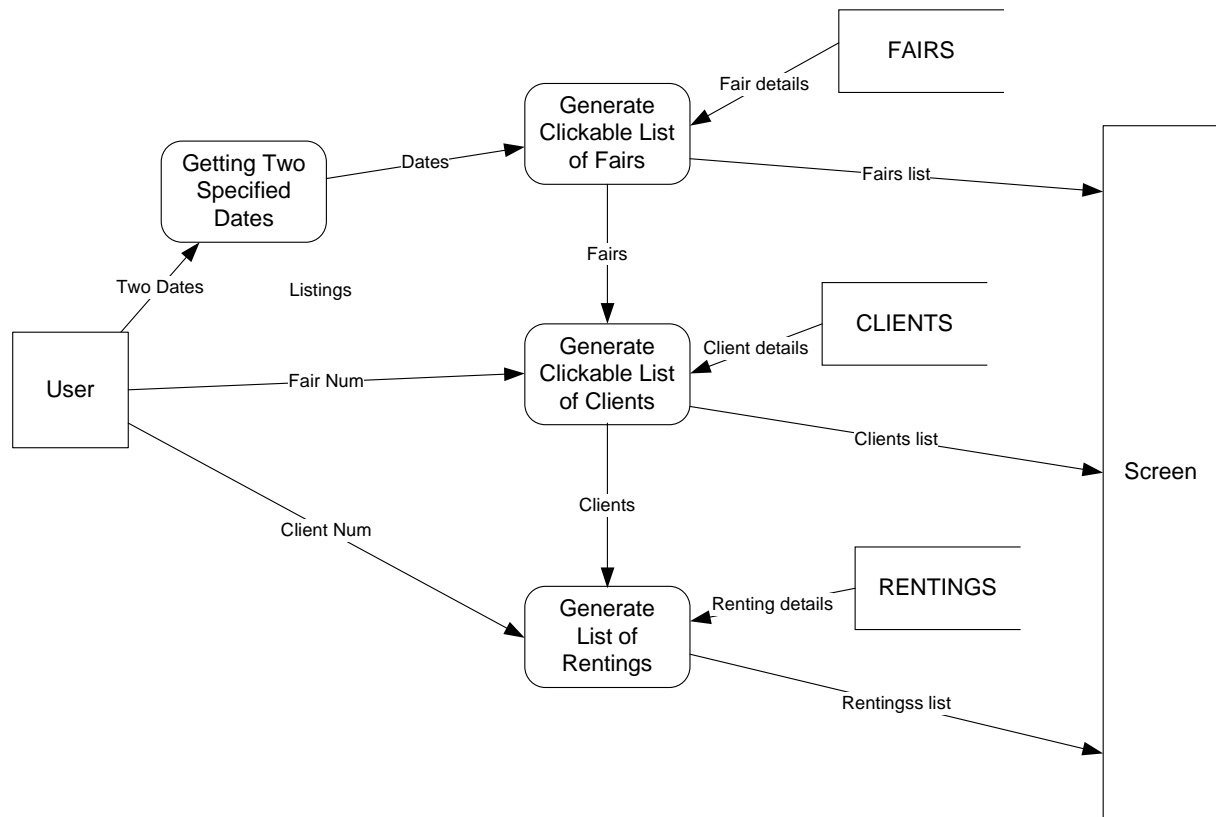
### Level-1 Data Flow Diagram





# Sub-Project2: Web Browsing Software

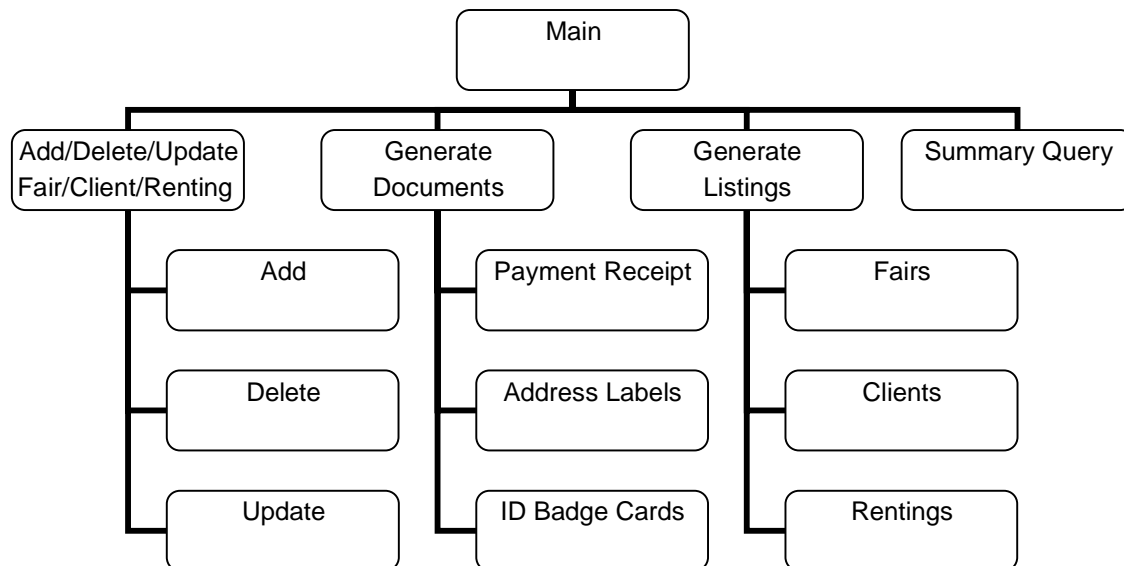
## Level-1 Data Flow Diagram



Q1 e) [10 points]

## Sub-Project1: Menu-driven Desktop Software

### Hierarchical Structure Chart



## Sub-Project2: Web Browsing Software

### Hierarchical Structure Chart



### TEST QUESTIONS (30 points)

1a, 2d, 3d, 4c, 5b, 6a, 7c, 8a, 9d, 10c, 11a, 12b, 13b, 14d, 15c, 16a, 17b, 18d, 19c, 20d