

BLG411E - Software Engineering 2007 Midterm Exam Keys

Q1 a) [15 points]

External Inputs (EI): (Total=5)

- Getting a start location and an end location for a query
- Getting a road name for a query
- Sensor statuses from sensors
- Operator manually updating the status of a road
- Menu selection

External Outputs (EO): (Total=3)

- List of sensors and their statuses.
- List of roads and their statuses.
- List of locations and their statuses.

External Inquiries (EQ): (Total=3)

- Displaying the total calculated time to get from Point A to Point B.
- Displaying the calculated number of people to get from Point A to Point B in an hour.
- Displaying the statuses of affected roads if Street B were to close.

Internal Logical Files (ILF): (Total=8)

- TOWNS
- ROADS
- LOCATIONS
- SENSORS
- VEHICLE TYPES
- TOWN-ROAD
- ROAD-VEHICLE
- ROAD CONNECTIONS

Unadjusted FP

Type of Component	Count	Average Weight	Total
External Inputs (EI)	5	x 4	20
External Outputs (EO)	3	x 5	15
External Inquiries (EQ)	3	x 4	12
Internal Logical Files (ILF)	8	x 10	80
External Interface Files (EIF)	0	x 7	0

TOTAL= 127

LOC = 127 UFP * 130 LOC/FP
= 16510 lines of code (in C language)
KLOC \approx 17

Q1 b) [10 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	PREC (Precedentedness)	Nominal - somewhat unprecedented (3.72)
2	FLEX (Development Flexibility)	High - general conformity (2.03)
3	RESL (Architecture/Risk Resolution)	Nominal - often (60%) (4.24)
4	TEAM (Team Cohesion)	Very High - Highly cooperative (1.10)
5	PMAT (Process Maturity)	Low - CMM Level 1 (upper half) (6.24)

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

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

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

$$PM = A * (KLOC)^E * \prod_{j=1}^7 EM_j = 2.94 * (17)^{1.0833} * 1.004 \cong 63 \text{ (Effort in Person - months)}$$

$$TDEV = C * (PM)^F = 3.67 * (63)^{0.3147} \cong 13 \text{ (Development Time in Months)}$$

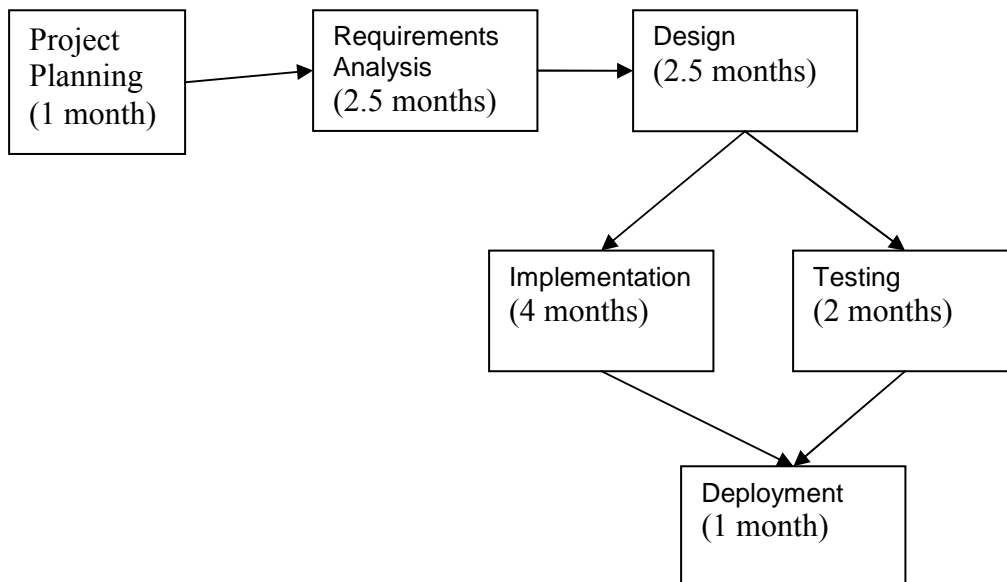
$$\text{Number of people} = PM / TDEV = 63 / 13 = 4.8 \approx 5$$

Q1 c) [10 points]

Tasks

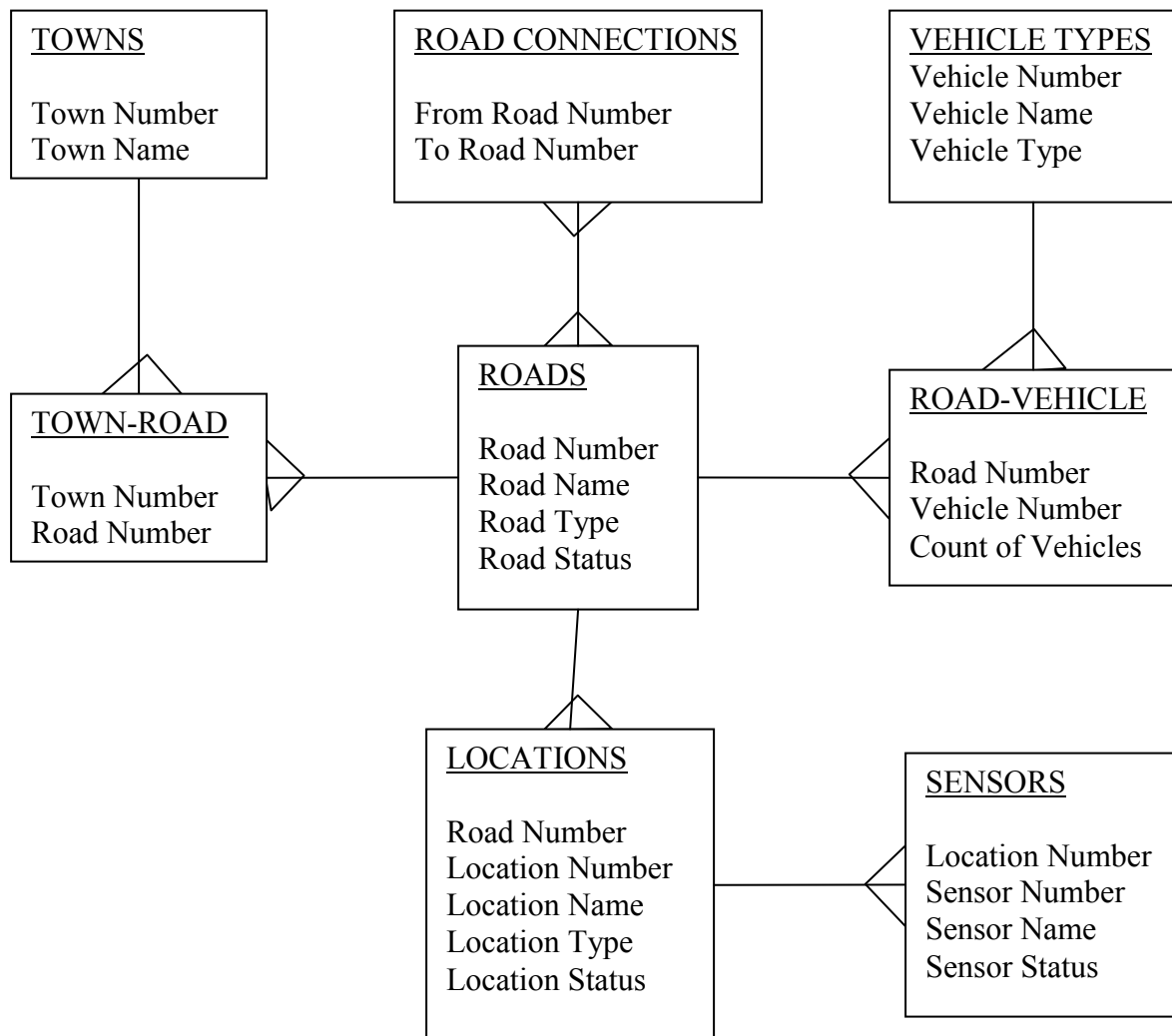
TASK	DURATION (MONTHS)
Project Planning	1
Requirements Analysis	2.5
Design	2.5
Implementation	4
Testing	2
Deployment	1
TOTAL	13

Task Network



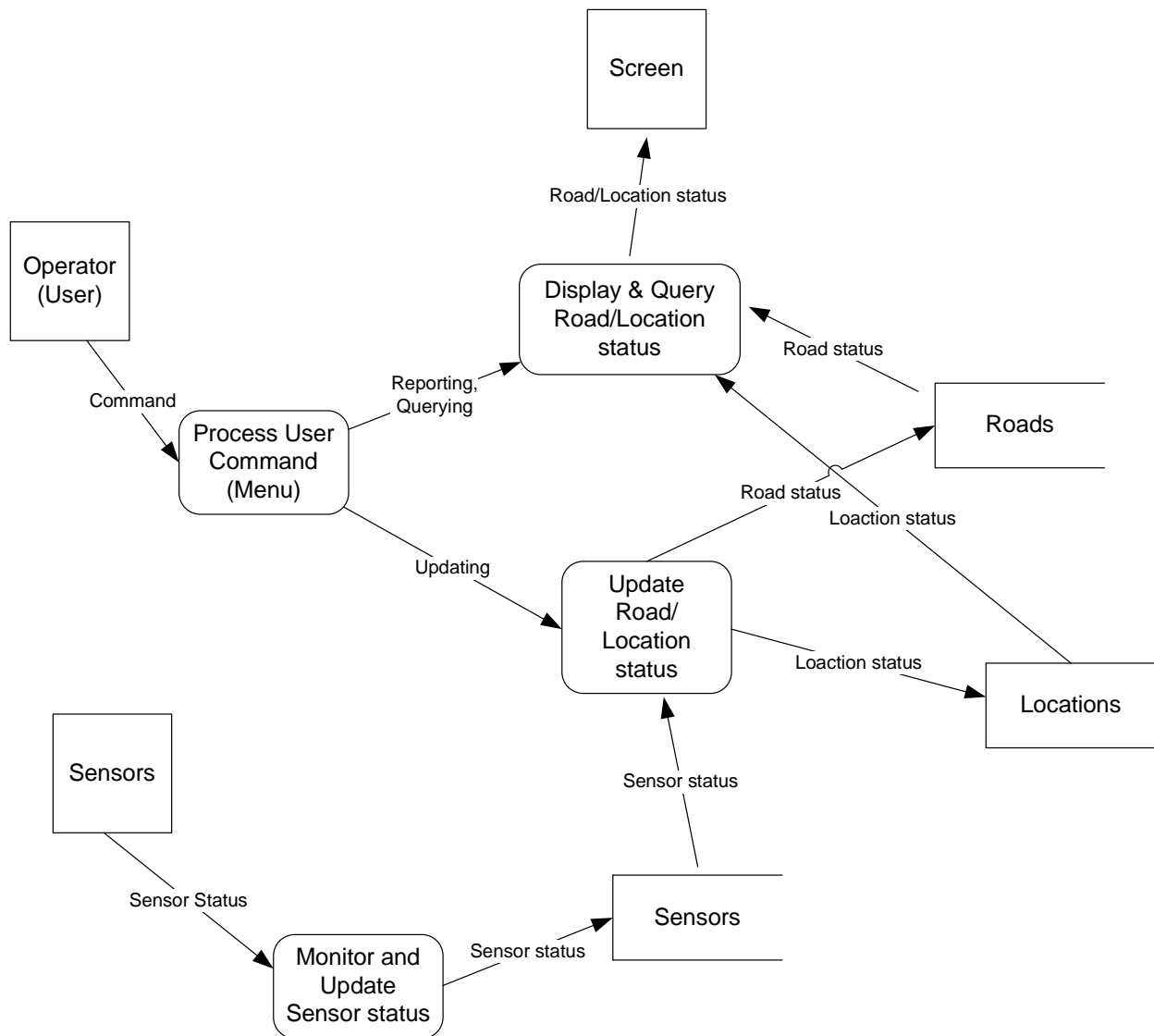
Q1 d) [15 points]

Entity-Relationship Diagram (ERD)



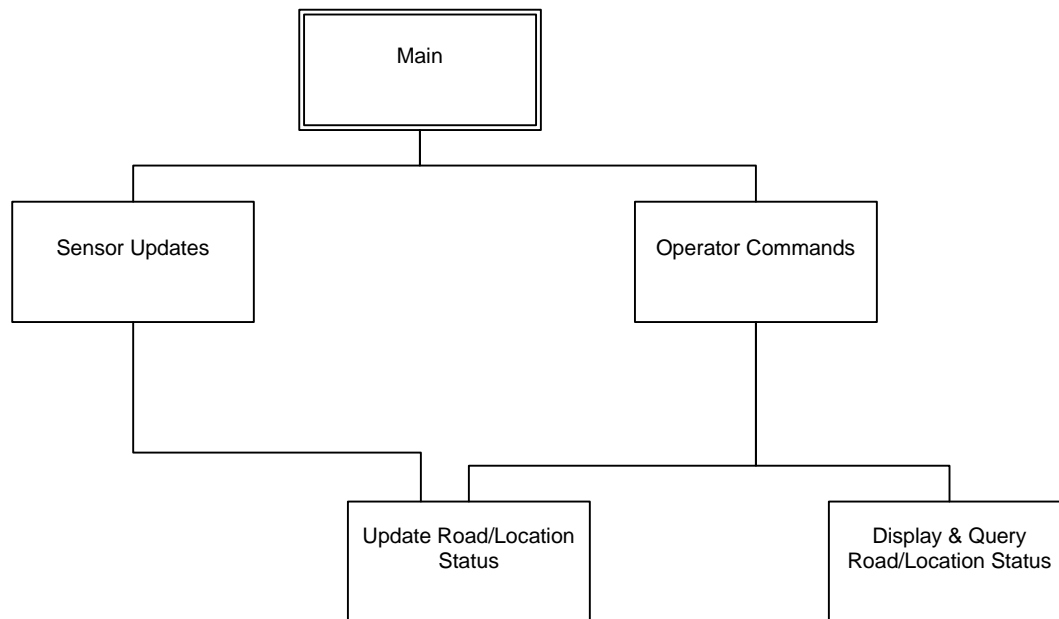
Q1 e) [10 points]

Level-1 Data Flow Diagram



Q1 f) [10 points]

Hierarchical Structure Chart



Q2) [10 points]

Most appropriate software process models for applications

a) A mobile-phone application involving new technology.

Rapid Prototyping Model

b) A payroll application whose requirements are well defined in advance.

Linear Sequential Model or

Waterfall Model

c) An enterprise application in which reusability is important.

Component-Based Model

d) A safety-critical industrial application.

Iterative Model

e) An accounting application with intensive user interface.

Incremental Model

TEST QUESTIONS (20 points)

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