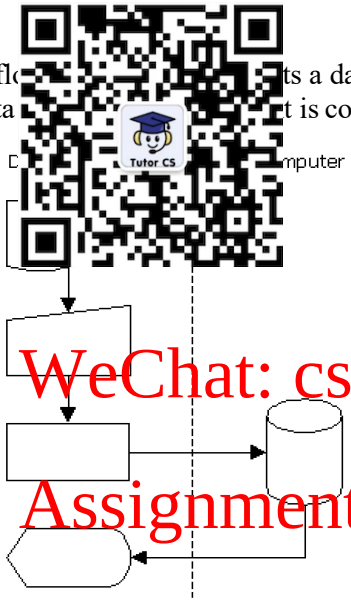
Section A (12 marks)

Which of the following data flow diagram (DFD) guidelines is incorrect?

A. include within the system context any entity that performs one or more information processing activities
B. read computer data stores from the process bubble that requires the data
C. include within the system context any entity in the system narrative
D. data flows should never go from higher- to lower-numbered bubbles

ANSWER: C

The following systems flowchart depicts a data entry clerk keying data from a source document into a business event data store. Which statement is correct?



A. The systems flowchart was created properly.
B. The arrow between the computer process and the data store should be bi-directional.
C. The computer process should be shown in the computer column.
D. The second symbol in the data entry clerk column should be a square.

ANSWER: C

What we refer to today as ERP evolved from _____.

A. SRM
B. MRP
C. JIT
D. ECM

ANSWER: B

Jenny Lim works as the Chief Knowledge Officer for Bright Star Company. She has been given the responsibility to create a product or service that will bring an added value to its customers to increase the company's revenue. Jenny determines that the best value she can add is by creating a service that offers free next day shipping on any order over $50. Where in the value chain is Jenny adding value?

A. The primary value activity outbound logistics.
B. The primary value activity inbound logistics.
C. The primary value activity marketing and sales.
D. The primary value activity operations.

ANSWER: A

Which of the following is considered information?

A. Date Sold
B. Quantity Sold
C. Best selling item by month
D. All the answers are correct

ANSWER: C

Data is useful for understanding individual sales, but to gain deeper insight into a business data needs to be turned into information. Which of the following offers an example of turning data into information?

A. Who are my best customers?
B. What is my best-selling product?
C. What is my worst-selling product?
D. All the answers are correct

ANSWER: D

Which of the following [illegible] that a company would duplicate a competitive advantage?

A. Acquiring the new t[illegible]
B. Copying the busine[illegible]
C. Hiring away key em[illegible]
D. Carrying large product inventories

ANSWER: D

A transaction processing system (TPS) is the basic business system that assists operational level analysts when making structured decisions. Which of the below is not an example of a TPS?

A. Target's internal company payroll system
B. Comfort Dental patient diagnosis system
C. First Bank's overall accounting system
D. Stewart Sport's order entry system

ANSWER: B

A symbol used in data flow diagrams (DFDs) to depict an entity or process within which incoming data flows are transformed into outgoing data flows is a(n):

A. data flow symbol
B. external entity symbol
C. bubble symbol
D. data store symbol

ANSWER: C

Which data flow diagram (DFD) symbol portrays a source or destination of data outside the system?

A. data flow symbol
B. external entity symbol
C. bubble symbol
D. data store symbol

ANSWER: B

Those entities which perform no information processing activities for the system are called:

A. environmental entities
B. internal entities
C. boundary entities
D. external entities

ANSWER: D

Which of the following data flow diagram (DFD) guidelines is **correct**?

A. Include within the system context any entity that performs one or more information processing activities.
B. Read computer data stores from the bubble that requires the data
C. Include within the system context any entity in the system narrative

D. Data flows should never go from higher- to lower-numbered bubbles
ANSWER: A

A business process _____

A. is a network comprising activities that have precedence relationships
B. can affect the efficiency of operations in the organization
C. that cuts across functional areas of an organisation may need to be re-designed
D. All of the above
ANSWER: D

Section B (40 marks)

Question 1

a. Would you agree that most organisations tend to make IT outsourcing decisions based on an economic perspective? Present your views. (2 marks)

b. Why do some organisations prefer selective IT outsourcing? Discuss. (3 marks)

c. ABC Credit receives an average of 1,200 credit applications per day. ABC's advertising touts its efficiency in respon[illegible]ns within hours. Daily application-processing activities, average times, and [illegible]ctivities (activities that must be completed before the next activity) are lis[illegible]

Activity	[illegible]ne (minutes)	Immediate predecessor
A	0.18	None
B	0.22	A
C	0.15	A
D	0.11	A
E	0.25	C and D
F	0.29	B and D
G	0.40	E and F
Total	1.60	

- Assuming an 8-hour day and using the longest activity rule as the primary rule to assign activities to stations. (4 marks)
- Compare the efficiency of the line with the theoretical maximum efficiency. (1 mark)

Answer:

a. Although the economic perspective is important, it may not always influence IT outsourcing decisions due to the following reasons:

i. Often costs and benefits involved particularly in the long term are hard to predict accurately;
ii. Organisations are fundamentally political entities and many decisions including IT outsourcing is influenced by power and politics. One cannot assume that organisations always follow a rational decision rooted in economic perspective.

b. Selective outsourcing is recommended when the level of technology involved in a particular IT application is complex. It is less risky than turning over responsibility for the entire IT function to an IT vendor. It can become the basis for establishing a partnership with the vendor that develops over time. It is more popular among large companies. Etc.

c.

- Cycle time per workstation = 480/1200 = 0.4 min/application

Station	Activities	Total time	Idle time
1	A and B	0.18 + 0.22 = 0.4	0.0
2	C and D	0.15 + 0.11 = 0.26	0.14
3	F	0.29	0.11
4	E	0.25	0.15
5	G	0.4	0.0
	Total	**1.60**	**0.40**

- Theoretic minimum = 1.60 min/0.4 min = 4
  Stations Efficiency = 1.60 / (5*0.4) = 80%
  Not achieving maximum efficiency since the actual workstations are more than the theoretical minimum workstations

Question 2

a. Describe how plant layout impacts material flow. (2 marks)
b. Load distance analysis is often used to design facilities layout. Define the load distance score. (3 marks)
c. A company with 4 departments has the load matrix in Table 1 and the current layout is shown in Figure 1.

Table 1: Load Matri

From/To	B
A	12
B	

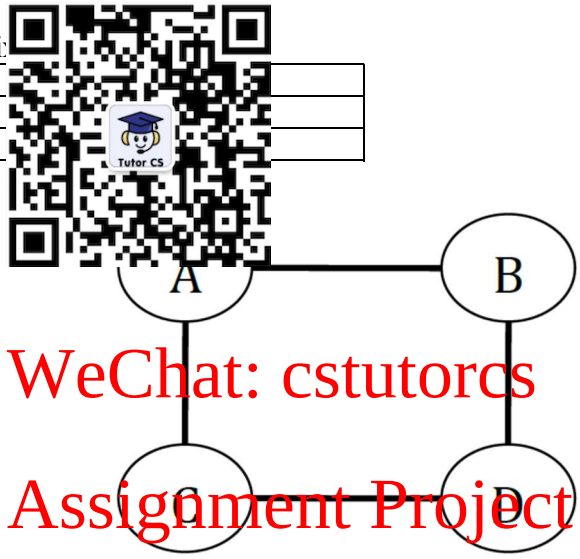


Figure 1: Current Layout of the four departments.

i. What is the load-distance score for the current layout? Assume rectilinear distance. (2 marks)
ii. Find a better layout for the company giving its total load-distance score. (3 marks)

Answer:

a. The plant layout impacts material flows. A well designed layout can lead to lower inventory levels, which can lead to quick throughput times as well a s quick response to customer demand. On the other hand, poorly designed layouts can lead to high internal transportation costs, lower productivity, and could also impact employee morale, which in turn could impact the quality of the product.
b. It measures the 'attraction' between two centres. The physical arrangements of people, equipment and space are important in process design. Location of work centres/workstations affects process efficiency. Load distance analysis is used to calculate the distances between work centres/work stations. It is defined as:

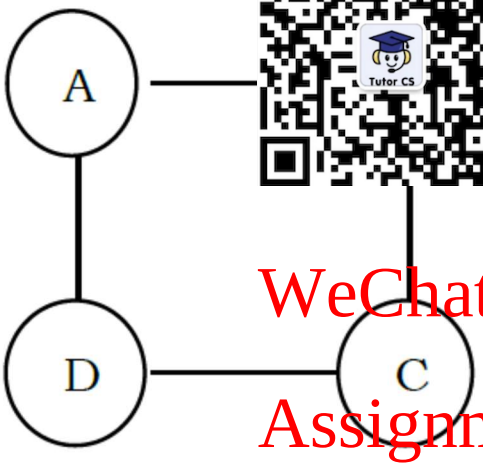
LD score (i,j) = Load (i,j) X Distance (i,j)

c.

		i. Current Design		ii. New Design	
Centres	**Load**	**Distance**	**LD score**	**Distance (see layout below)**	**LD score**
(A,B)	12	1	12	1	12
(A,C)	10	1	10	2	20
(A,D)	8	2	16	1	8
(B,C)	20	2	40	1	20
(B,D)	6	1	6	2	12
		Total	**84**		**72**

To improve the layout design further we can look at the LD scores above and try to decrease the distance for the pairs with the highest scores.

		i. Current Design		ii. New Design	
Centers	Load	Distance	LD score	Distance (see layout below)	LD score
		Total			



Question 3

a. What are the charts that are typically used for process flow analysis? (2 marks)
b. Describe the meaning of quality (2 mark)
c. Why is it important to continually monitor process performance? (3 marks)
d. A branch office of the University Federal Credit Union processes 3,000 loan applications per year. On average, loan applications are processed in 2 weeks. Assuming 50 weeks per year, how many loan applications can be found in the various stages of processing within the bank at any given time? (3 marks)

Answer:

a) General process cl gram, process activity chart, flow-chart.

b) Quality has differe rent people, and difficult to define. However, in general, quality is perceive either meeting or exceeding expectations. When it comes down to it, quality begins and ends with the end customer.

c) When processes do not achieve the intended outcomes, managers and users want to be notified, so redesigns, repairs, or rethinking can occur to fix problems or otherwise get processes back to desired performance levels. To accomplish this, performance measurement systems must be in place to continually test or monitor process outputs and compare them to desired outcomes or standards.

d)

λ = Throughput (arrival) rate = 3000 applications per year
CT = Average time each application spends in the system = 2 weeks = 2/50) years
WIP = Average number of applications in the system
WIP = λ∗CT = 3000(2/50) = 120 applications

Question 4

a. What is the relationship between WIP and the input and output rates over time? (5 marks)
b. Consider the process flow chart in Figure 2. The estimated waiting time and processing time for each activity in the process are shown in Table 2. All times are given in minutes. Assuming a job is never reworked more than once in the same work loop.
   i. Calculate the average CT for this process. (3 marks)
   ii. Calculate the CT efficiency. (2 marks)

Table 2: Activity Tin

Activity	Waitin	Processing Time (min)
A		3
B		8
C		2
D	10	5
E	7	2
F	0	3
G	2	5
H	8	9
I	2	8

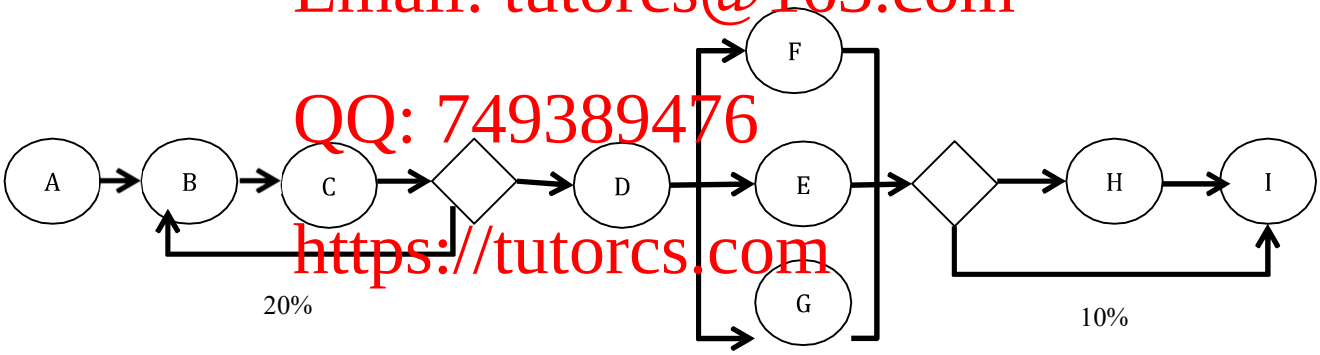


Figure 1: Process flow chart

Answer:

a) Define:

$R_i(t)$ = rate of incoming jobs through all entry points into the process
$R_o(t)$ = rate of outgoing jobs through all exit points from the process

Because the inflow rate and the outflow rate vary over time, the work-in-process also fluctuates. We refer to the work-in-process at time t as WIP(t). The up and down fluctuation of WIP(t) obeys the following rules:

- WIP(t) increas . The increase rate is $R_i(t)$ - $R_o(t)$.
- WIP(t) decreas . The decrease rate is $R_o(t)$ - $R_i(t)$.

Figure 5 shows the work served over a period of time.

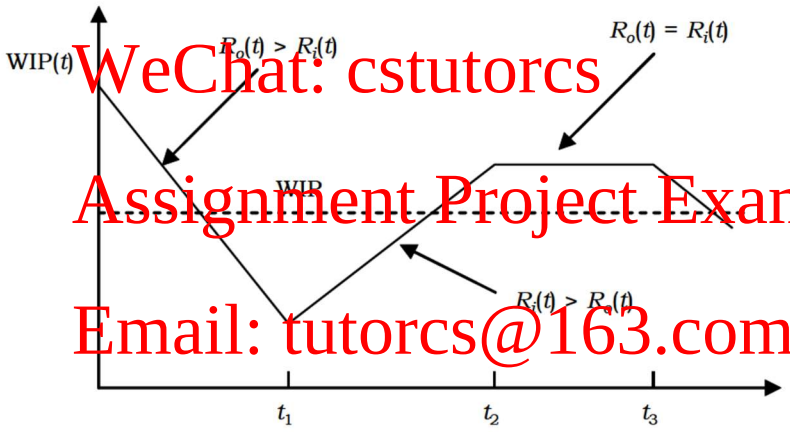


Figure 5: Work-in-process level over time

From the beginning of the observation horizon to the time labeled as t_1, the outflow rate is larger than the inflow rate, and therefore the work-in-process is depleted at a rate that is the difference between the two flow rates. That is, the work-in-process decreases at a rate of $R_o(t)$- $R_i(t)$ during the beginning of the observation period until time t_1. During the time period from t_1 to t_2, the inflow rate is larger than the outflow rate and therefore the work-in-process increases. The work-in-process stays constant from time t_2 to time t_3, indicating that the inflow and the outflow rates are equal during this period.

The average work-in-process is also of interest. To calculate the average WIP, we add the number of jobs in the process during each period of time and divide the sum by the number of periods in the observed time horizon. We will use WIP to denote the average (or expected) number of jobs in the process. The dashed line in the figure represents the average work-in-process during the observed period.

b)

$CT = T_A+(1+0.2)(T_B+T_C)+T_D+\max\{T_E, T_F, T_G\}+0.9(T_H)+T_I$
The activity time = Processing time + Waiting time
$\Rightarrow$ CT = 10+1.2(13+6)+15+max{9, 3, 7}+0.9(17)+10 = 82.1 minutes

The theoretical cycle time (CT^*) is obtained by using the processing times instead of the activity times (i.e., by disregarding the waiting time).
CT^* = 3+1.2(8+2)+5+max{2, 3, 5}+0.9(9)+8 = 41.1 minutes
The Cycle Time Efficiency = 41.1/82.1, about 50%

Section C: Mini Case

From Stand-Alone to Integrated Applications

YIOULA Group is the largest glass manufacturer in the Balkan, producing over 625,000 glass containers annually as well as over 30,000 tons of tableware. Starting in the 1980s in Greece, the company expanded by acquiring other glassmaking forms in Romania, Bulgaria and Ukraine. The company has 7 factories in 4 countries, about 2,100 employees, and net annual sales of about €180 [illegible] $280 million).

As a result of its gr[illegible]tion, YIOULA Group found itself with a confusing variety of informati[illegible]up was unable to compare production costs for the same item across factorie[illegible] efficiencies by coordinating purchasing and financial management across [illegible]ot positioned for continued growth or expansion into new market areas. C[illegible]nd-alone applications needed to be replaced.

YIOULA Group CIO Zacharias Maridakis had previous experience using integrated enterprise software when he worked at Mobil Oil's Greek subsidiary, Mobil Oil Hellas S.A., in the 1990s. Therefore he was well acquainted with the advantages of the software. Under his direction, YIOULA Group investigated various software packages. They selected JD Edwards EnterpriseOne, named for a company that had become part of Oracle Corporation in 2005. Part of the reason for this choice was that most other ERP packages, including the SAP software with which Maridakis had worked at Mobil, are designed primarily for much larger organisations. EnterpriseOne was always intended to medium-sized firms.

Because YIOULA Group had little experience with EnterpriseOne, it enlisted the help of Oracle partner Softecon to help configure the software to the company's needs, meet the legal requirements of each region in which it operates, and manage implementation in each area. Support for the Greek language (as well as English and 18 others) is a standard JD Edwards EnterpriseOne capability available from Oracle; Softecon added the other languages that YIOULA Group needed to the user interface. YIOULA Group also added a specialised cost comparison module from Softecon to the basic EnterpriseOne package. This module helps the group choose the lowest cost facility to manufacture a product.

The conversion to a single enterprise package gave YIOULA Group the expected benefits. Times from order to invoice, delivery time, and cash collection have all been accelerated. Financial data is now available two weeks after the end of a period versus one month previously. A consolidated view of inventory across all plants has enabled the group to manage inventory more efficiently and comprehensively and to use just-in-time purchasing methods.

Perhaps even more importantly, YIOULA Group is now positioned to grow. As Maridakis puts it, "Oracle's JD Edwards EnterpriseOne is a key enabler of our strategy to enhance market leadership in the Balkans, grow our business in the Ukraine, and continue to improve productivity, efficiency, and profitability as we expand into new markets."

a. What an enterprise system is? Discuss the advantages of an enterprise system. (3 marks)

Enterprise Systems - Ensure that information can be shared across all business functions and all levels of management to support the running and managing of a business. The ultimate goal is to satisfy customers and provide significant benefits by reducing costs and improving service. (See also Lecture 2, page 59)

b. Discuss the problems the YIOULA Group's stand-alone legacy software created for the company? (3 mark)

The group was unable to compare production costs for the same item across factories, could not improve efficiencies by coordinating purchasing and financial management across all its plants, and was not positioned for continued growth or expansion into new market areas. (Also discuss the impact towards organisation's internal efficiency and external effectiveness)

c. Describe the advantages of Enterprise Resource Planning (ERP) systems over stand-alone software packages? (3 mark)

The primary benefit[illegible]RP include improved access to quality data for operational decisior[illegible]n of inefficient or outdated systems, improvement of work processes, anc[illegible]lization. (See also Lecture 2, page 58 & 60)

d. What immediate an[illegible]d EnterpriseOne fill for the YIOULA Group? (3 mark)

The conversion to a single enterprise package gave YIOULA Group the expected benefits. Times from order to invoice, delivery time, and cash collection have all been accelerated. Financial data is now available two weeks after the end of a period versus one month previously. A consolidated view of inventory across all plants has enabled the group to manage inventory more efficiently and comprehensively and to use just-in-time purchasing methods. Perhaps even more importantly, YIOULA Group is now positioned to grow.

e. What are the challenges of implementing ERP? Discuss how organisations such as YIOULA, could overcome these issues or challenges. (6 mark)

(See also Lecture 2, page 61-64)