

## Software Cost Estimation Lecture 1 “Chapter 1”

1-Project planning involves breaking down the work into parts and design these to project team members .

- a- True
- b- False

Answer : a , note “ there will some tentative solutions “

2- \_\_\_\_\_ involves estimating how much the software will cost to develop.

- a- Designing
- b- Implementation
- c- Project pricing
- d- Project development

Answer : c .

3- \_\_\_\_\_ , Is a factor of project pricing .

- a- Staff costs
- b- Hardware costs
- c- Both
- d- None

Answer : c.

4- \_\_\_\_\_ , are methods of software development that are geared to rapid software delivery .

- a- Sequential methods
- b- Agile methods
- c- None
- d- Both

Answer : b.

5- At agile methods the focus of development is on the code itself , rather than supporting documents .

- a- True
- b- False

Answer : a, note “ if you’re using agile methods for your graduation project , wish you best“

6- The project schedule , cost estimate and risks have to be regularly revised .

- a- True
- b- False

Answer : a.

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7-The software pricing estimates are made to discover the \_\_\_\_.

- a- Cost of development
- b- Profit for the developers
- c- Both
- d- None

Answer : c.

8- If an organization is unsure of its cost estimate , it may increase its price by a contingency over and above its normal profit is a description of \_\_\_\_.

- a- Contractual terms
- b- Cost estimate uncertainty
- c- Financial Health
- d- None

Answer : b.

9- The requirements are likely to change ,nothing is fixed , the requirements are volatile.

- a- True
- b- False

Answer : a.

10- A company may underprice a system \_\_\_\_.

- a- In order to gain a contract that allows them to retain staff for future.
- b- To gain access to a new market area
- c- Both
- d- None

Answer : .c

11-A price may be increased when a buyer wishes a fixed price contract and so the seller increases the price to allow for unexpected risks.

- a- True
- b- False

Answer : a.

12- \_\_\_\_\_ is the process of deciding how the work in a project will be organized as separate tasks.

- a- Project pricing
- b- Project planning
- c- Project scheduling
- d- All above

Answer : c.

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13- \_\_\_\_ is an example of project scheduling activities .

- a- Split project into tasks
- b- Minimize task dependencies
- c- Organize tasks concurrently
- d- All above

Answer : d.

14- Estimating the difficulty of problems and hence the cost of developing a solution is \_\_\_\_.

- a- Easy
- b- Hard
- c- Impossible
- d- None

Answer : b.

15- Productivity is proportional to the number of people working on a task.

- a- True
- b- False

Answer : b.

16- Adding people to a late project makes it later .

- a- True
- b- False

Answer : a.

17- \_\_\_\_ are normally used to illustrate the project schedule.

- a- Graphical notations
- b- To do lists
- c- None
- d- Both

Answer : a.

18- \_\_\_\_ are the most commonly used representation for project schedules .

- a- Pen and paper
- b- To do list
- c- Bar chart
- d- None

Answer : c.

19- Each activity (task) has , duration , effort estimate , dead line , and a defined end point .

- a- True
- b- False

Answer : a.

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20 \_\_\_\_ are work products that are delivered to the customer.

- a- Milestones
- b- Deliverables
- c- Both
- d- None

Answer : b.

21- Milestones are points in the schedule against which you can assess progress.

- a- True
- b- False

Answer : a.

22- People may be work on more than one task at the same time .

- a- True
- b- False

Answer : a.

23- \_\_\_\_ assignments are shown using a diagonal line crossing the bar .

- a- Full time
- b- Part time
- c- None
- d- Both

Answer : b.

24-\_\_\_\_\_, are the estimate of future effort requirements based on the manager's experience of past projects and the application domain.

- a- Experience-based techniques
- b- Algorithmic cost modeling
- c- Both
- d- None

Answer : a .

25-\_\_\_\_\_, in this approach a formulaic approach is used to compute the project effort based on estimates of product attributes , such as size and processes .

- a- Experience-based techniques
- b- Algorithmic cost modeling
- c- Both
- d- None

Answer : b.

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26- \_\_\_\_\_ rely on judgments based on experience of past projects and the effort expended in these projects on software development activities .

- a- Experience-based techniques
- b- Algorithmic cost modeling
- c- Both
- d- None

Answer : a.

27- A difficult thing with experience based techniques is that a new software project may not have much common with previous projects.

- a- True
- b- False

Answer : a.

✧ **Cost is estimated as a mathematical function of *product*, *project* and *process* attributes whose values are estimated by project managers:**

$$\text{Effort} = A \times \text{Size}^B \times M$$

- ***A* is an organisation-dependent constant, *B* reflects the disproportionate (non linear) effort for large projects and *M* is a multiplier reflecting product, process and people attributes.**

28- The most commonly used product attribute for cost estimation is \_\_\_\_.

- a- App size in Mb
- b- App Size in Gb
- c- Code Size
- d- None

Answer : c.

29- The size of a software system can only be known accurately at the beginning of it .

- a- True
- b- False

Answer : b, explanation ( “ When it’s finished “ )

30- \_\_\_\_\_ is a factor that influences the final size .

- a- Using of reused systems and components
- b- Programming languages
- c- Distribution of systems
- d- All above

Answer : d.

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31- From the previous page the factors contributing to B and M are \_\_\_\_ .

- a- Objective
- b- Subjective
- c- Both
- d- None

Answer : b , note “ it varies according to the judgement of the estimator “

32-Algorithmic cost models are systematic way to estimate the effort and these models are complex and difficult to use .

- a- True
- b- False

Answer : a.

33- \_\_\_\_\_ is an empirical model based on project experience .

- a- COCOMO
- b- COCO
- c- COMOMO
- d- None

Answer : a , note “ COCOMO -> Constructive Cost Modeling”

34- COCOMO 2 models incorporates a range of sub models that produce increasingly detailed software estimates .

- a- True
- b- False

Answer : a.

35- A sub-model of COCOMO 2 : \_\_\_\_.

- a- App composition model
- b- Early design model
- c- Reuse model
- d- All above

Answer : d.

36- \_\_\_\_\_ , used when software is composed from existing parts .

- a- App composition model
- b- Early design model
- c- Reuse model
- d- Post-architecture model

Answer : a.

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37- \_\_\_\_\_ used to compute the effort of integrating reusable components .

- a- App composition model
- b- Early design model
- c- Reuse model
- d- Post-architecture model

Answer :c.

38- \_\_\_\_\_ is used once the system architecture has been designed and more information about the system is available .

- a- App composition model
- b- Early design model
- c- Reuse model
- d- Post-architecture model

Answer : d.

39- \_\_\_\_\_ , supports prototyping projects and projects where there is extensive reuse.

- a- App composition model
- b- Early design model
- c- Reuse model
- d- Post-architecture model

Answer : d.

$$PM = ( NAP \times (1 - \%reuse/100) ) / PROD$$

- **PM** is the effort in person-months, **NAP** is the number of application points, **%reuse** is an estimate of the amount of reused code in the development, and **PROD** is the productivity (see next figure).

40- Productivity depends on the developer’s experience and capability as well as the capabilities of the software tools used to support development.

- a- True
- b- False

Answer : a.

“An example explained in the next page “

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**$PM = A \times \text{Size}^B \times M$**  where

- **$M = PERS \times RCPX \times RUSE \times PDIF \times PREX \times FCIL \times SCED$** ;
- **$A = 2.49$**  in initial calibration, (proposed value based on large dataset)
- **Size** in KSLOC (number of thousands of lines of source code)
- **$B$**  varies from **1.1 to 1.24** depending on **novelty of the project, development flexibility, risk management approaches, the cohesion of the development team, and the process maturity level of the organization.**
- The multiplier  **$M$**  is based on **seven project and process attributes** that increase or decrease the estimate.

“ Let’s be on the same page and understand the PM formula,

- a- First the A is constant which equals to 2.49
  - b- The M has 7 factors we will always have a look at
  - c- At every question we must search for them so we get
  - d- The value of M
  - e- Now with the Size which will be in KSLOC
  - f- Number of thousands of lines of source code
  - g- The question will give for example 150,000 Lines
  - h- So Size = 150 .
  - i- Finally the B which varies from 1.1 to 1.24 depends c
  - j- The project development 1- flexibility , 2- risk management , 3- the cohesion of the development team 4- the process maturity level “ we will understand more with an example.
- **$RCPX$**  - product reliability and complexity;
  - **$RUSE$**  - the reuse required;
  - **$PDIF$**  - platform difficulty;
  - **$PREX$**  - personnel experience;
  - **$PERS$**  - personnel capability;
  - **$SCED$**  - required schedule;
  - **$FCIL$**  - the team support facilities.

41- at \_\_\_\_\_ , where code is not modified .

- a- Black box – reuse
- b- White box – reuse
- c- Both
- d- None

Answer : a.

42- An example of black box reuse are components that automatically generated from UML models or app libraries such as graphics or libraries .

- a- True
- b- False

Answer : a.

43- White box reuse where code is modified.

- a- True
- b- False

Answer : a.



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- 44- \_\_\_\_ Is a factor contributes to the effort involved in reusing white box code components .
- a- The effort involved in assessing whether or not a component could be reused
  - b- The effort required to understand the code that is being reused
  - c- The effort required to modify the reused code to adapt it and integrate it with the system being developed
  - d- All above

Answer : d .

45- A company takes on a project in a **new domain**. The client **has not defined the process** to be used and has **not allowed time for risk analysis**. The company has a **CMM level 2 rating** (Capability Maturity Model is a framework for assessing how well organizations manage the development of their staff).

“ Let’s break the question down and understand every point “

“ They’re asking us to get the value of the Exponent term **B** which depends on 5 scale factors which are rated on a six point scale from 0 to 5 where 0 means extra high while 5 means very low.”

- To calculate **B**, you add the ratings, divide them by 100, and add the result to 1.01 to get the exponent that should be used.  **$[(\text{The sum of scale factors}/100) + 1.01]$**

Let’s first the 5 factors one by one

- 1- Precedented ness - > New project ( **4** )
  - a. Why 4 ? , first the project is new means it will be at a low level , you can give 4 or 5 .
- 2- Development flexibility - > no client involvement - > very high ( **1** )
  - a. Why is it high ? there is no mentions that the client will put any “ حدود ” for the company or the project so we will assume it’s 1 .
- 3- Architecture / risk resolution -> no risk analysis - > very low ( **5** )
  - a. Why very low , at the question they mentioned that there is no allowed time for risk analysis which means it’s very low .
- 4- Team cohesion - > new team - > ( **3** )
  - a. The project involves a new team which means the team members may not havea prior experience so we will go with the mean which is 5 .
- 5- Process maturity - > some control ( **3** )
  - a. The question mentioned the CMM equals to 2 , we can get the value of the process maturity by ( 5-cmm ) which means  $5-2 = 3$  which is nominal value means it may be highly advanced nor critically lacking .
  - b.

“ Remember at the mid term or other we must write what’ve just wrote so understand please “

The sum of these values is **16**. You then calculate the final value of the exponent by **dividing this sum by 100 (gives 0.16)** and adding **1.01** to the result. The adjusted value of B is therefore **1.17**.

Therefore the exponent is  **$B = 1.17$** .

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46- \_\_\_\_\_ , reflects the extent of risk analysis carried out .

- a- Architecture / risk resolution
- b- Development flexibly
- c- Precedented ness
- d- Process maturity
- e- Team cohesion

Answer : a.

47- \_\_\_\_\_ , reflects the previous experience of the organization with this type of project.

- a- Architecture / risk resolution
- b- Development flexibly
- c- Precedented ness
- d- Process maturity
- e- Team cohesion

Answer : c.

48- \_\_\_\_\_ , reflects how well the development team knows each other and work together.

- a- Architecture / risk resolution
- b- Development flexibly
- c- Precedented ness
- d- Process maturity
- e- Team cohesion

Answer : e.

Scale factor	Explanation
Architecture/risk resolution	Reflects the extent of <b>risk analysis</b> carried out. Very low means little analysis; extra-high means a complete and thorough risk analysis. <b>(5)</b>
Development flexibility	Reflects the degree of <b>flexibility in the development process</b> . Very low means a prescribed process is used; extra-high means that the client sets only general goals. <b>(1)</b>
Precedentedness	Reflects the <b>previous experience</b> of the organization with this type of project. Very low means no previous experience; extra-high means that the organization is completely familiar with this application domain. <b>(4)</b>
Process maturity	Reflects the <b>process maturity of the organization</b> . The computation of this value depends on the <b>CMM Maturity Questionnaire</b> , but an estimate can be achieved by <b>subtracting the CMM process maturity level from 5. (5 – CMM level 2 = 3)</b>
Team cohesion	Reflects how well the <i>development team</i> <b>knows each other and work together</b> . Very low means very difficult interactions; extra-high means an integrated and effective team with no communication problems. <b>(3)</b>

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“ We’ve how to get the value of B and it’s factors now let’s go with the M “

Reliability (**RELY**), complexity (**CPLX**), storage (**STOR**), tools (**TOOL**), and schedule (**SCED**) **are the key cost drivers** in the project. **All of the other cost drivers have a nominal value of 1**, so they **do not affect the effort computation**.

49- \_\_\_\_\_, concerned with required characteristics of the software product being developed.

- a- Product attributes
- b- Computer attributes
- c- Personnel attributes
- d- Project attributes .

Answer : a.

50- \_\_\_\_\_, Multiplies that take the experience and capabilities of the people working on the project into account.

- a- Product attributes
- b- Computer attributes
- c- Personnel attributes
- d- Project attributes .

Answer : c.

“The value of M is equal to multiplying all the factors here are example “

Exponent value	1.17
System size (including factors for reuse and requirements volatility)	128,000 KLOC
<b>Initial COCOMO estimate without cost drivers (M = 1)</b>	<b>730 person-months</b>
<b>Reliability (RELY)</b>	Very high, multiplier = 1.39
<b>Complexity (CPLX)</b>	Very high, multiplier = 1.3
<b>Memory constraint (STOR)</b>	High, multiplier = 1.21
<b>Tool use (TOOL)</b>	Low, multiplier = 1.12
<b>Schedule (SCED)</b>	Accelerated, multiplier = 1.29

**Initial effort estimate without cost drivers:  $PM = A \times Size^B \times M$**

$$PM = 2.49 \times 128^{1.17} \times 1 \approx 730$$

“ Here for example M is equal to 1 if they didn’t give any factors , but after multiplying all factors”

**You can see that high values for the cost drivers lead an effort estimate that is more than three times the initial estimate:**

$$PM = 2.49 \times 128^{1.17} \times (1.39 \times 1.3 \times 1.21 \times 1.12 \times 1.29) \approx 730 \times 3.16 \approx 2306$$

## Software Cost Estimation Chapter 2

1-Estimation needs to be one time task in a project.

- a- True
- b- False

Answer: b , explanation ( "it could take a place at many things related to the project such as planning or acquiring a project " )

2- \_\_\_\_\_ , must be understood before the estimation process begins.

- a- Project scope
- b- Project metrics
- c- Planning
- d- None

Answer : a.

3-\_\_\_\_\_ can provide a historical perspective and valuable input for generation of quantitative estimates.

- a- Project scope
- b- Project metrics
- c- Planning
- d- None

Answer : b.

4-\_\_\_\_\_ , requires technical managers and the software team to make an initial commitment as it leads to responsibility and accountability.

- a- Project scope
- b- Project metrics
- c- Planning
- d- None

Answer : c.

5-Plans should be iterative and allow adjustments as time passes and more details are known.

- a- True
- b- False

Answer: a.

6-\_\_\_\_\_ is a way to describe the work you are agreeing to deliver.

- a- Project scope
- b- Project metrics
- c- Planning
- d- Scope

Answer : d.

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7- \_\_\_\_ is an indication of how close something is to reality is.

- a- Composition
- b- Estimation
- c- Accuracy
- d- None

Answer : c.

8- \_\_\_\_ is a factor which affects the accuracy estimation.

- a- All of the estimated input data
- b- Any calculations
- c- How closely historical data to calibrate the model matches the project
- d- All above

Answer : d.

9-To achieve a reliable estimates it's great to \_\_\_\_.

- a- Have a base estimation on similar projects
- b- Use relative simple decomposition techniques
- c- Use one or more empirical estimations models
- d- All above

Answer : d.

10- Resource utilization should be considered as a \_\_\_\_ .

- a- More than 80%
- b- 100%
- c- Less than 80%
- d- None

Answer : c.

11-If you assign resources at more than 80% utilization there is bound to be \_\_\_\_.

- a- Problems
- b- Slippages
- c- More output
- d- None

Answer : b.

12-Number of UCPs(Use Case Points ) in a project is based on :

- a- Number and complexity of the use cases in the system
- b- Number and complexity of the actors on the system
- c- Various non functional requirements
- d- The environment
- e- All above

Answer : e

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13-User cases were developed originally to support requirements elicitation and how incorporated into the UML.

- a- True
- b- False

Answer : a.

14-Each use case represent a discrete task that involves **internal** interactions with a system.

- a- True
- b- False

Answer : b.

15-Actors in the use case could be \_\_\_\_.

- a- People
- b- Systems
- c- Both
- d- None

Answer : c.

Explanations to get the **Use Case Points** :

### **Use-Case Points Counting Process**

**The Use-Case Points counting process has the following steps –**

- ✧ Calculate **unadjusted UCPs**
- ✧ Adjust for **technical complexity**
- ✧ Adjust for **environmental complexity**
- ✧ Calculate **adjusted UCPs**

" شرح خطوات تفصيليه وبعدين مثال يلخص كله "

**Step1** : We calculate the unadjusted Use case points . which we will need to get other things in order to calculate the first step :D

So let's break it Down

### **Use-Case Points Counting Process :**

**Step 1** : calculate the unadjusted Use case points

**Step 1** : Determine unadjusted use case weight

**Step 2** : Determine unadjusted Actor weight

**Step 3** : Determine unadjusted Use case points

Alright now here are some tables we must understand related to "**Step 1** : Determine unadjusted use case weight"

The follow 2 iimages

Are related to step 1.1

#### **Step 1.1.1: Find the number of transactions in each Use-Case**

If the Use-Cases are written with *User Goal Levels*, a transaction is equivalent to a step in the Use-Case. Find the number of transactions by counting the steps in the Use-Case.

**Step 1.1.2:** Classify each Use-Case as **Simple, Average or Complex** based on the number of transactions in the Use-Case. Also, assign Use-Case Weight as shown in the following table:

Use-Case Complexity	Number of Transactions	Use-Case Weight
Simple	≤3	5
Average	4 to 7	10
Complex	>7	15

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**Step 1.1.3:** Repeat for each Use-Case and get all the Use-Case Weights.

**Step 1.1.4:** Find **Unadjusted Use-Case Weight (UUCW)** as the sum of all the Use-Case Weights multiplied by the number of use case as shown in the following table, where **NSUC, NAUC, and NCUC** are the number of simple, average, and complex use cases respectively :

Use-Case Complexity	Use-Case Weight	Number of Use-Cases	Product
Simple	5	NSUC	$5 \times \text{NSUC}$
Average	10	NAUC	$10 \times \text{NAUC}$
Complex	15	NCUC	$15 \times \text{NCUC}$
Unadjusted Use-Case Weight (UUCW)			$5 \times \text{NSUC} + 10 \times \text{NAUC} + 15 \times \text{NCUC}$

Alright now here are some tables we must understand related to “[Step 2](#) : Determine unadjusted actor weight”

Based on differences of the actors we must classify actors as simple ,average or complex.

**Step 1.2.1:** Classify Actors as **Simple, Average and Complex** and assign Actor Weights as shown in the following table:

Actor Complexity	Example	Actor Weight
Simple	A System with defined API	1
Average	A System interacting through a Protocol	2
Complex	A User interacting through GUI	3

**Step 1.2.2:** Repeat for each Actor and get all the Actor Weights.

**Step 1.2.3:** Find **Unadjusted Actor Weight (UAW)** as the sum of all the Actor Weights multiplied by the number of actors as shown in the following table:

Actor Complexity	Actor Weight	Number of Actors	Product
Simple	1	NSA	$1 \times \text{NSA}$
Average	2	NAA	$2 \times \text{NAA}$
Complex	3	NCA	$3 \times \text{NCA}$
Unadjusted Actor Weight (UAW)			$1 \times \text{NSA} + 2 \times \text{NAA} + 3 \times \text{NCA}$

Where: **NSA, NAA, and NCA** are the number of **Simple, average, and complex** Actors respectively.

Alright now here are some tables we must understand related to “[Step 3](#) : Determine unadjusted use case points”

The **Unadjusted Use-Case Weight (UUCW)** and the **Unadjusted Actor Weight (UAW)** together give the unadjusted size of the system, referred to as **Unadjusted Use-Case Points**.

$$\text{Unadjusted Use-Case Points (UUCP)} = \text{UUCW} + \text{UAW}$$

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Consider the 13 Factors that contribute to the impact of the Technical Complexity of a project on Use-Case Points and their corresponding Weights as given in the following table:

“we will add only the factors mentioned on the questions “

- ✧ Many of the factors in the previous table represent the project's **nonfunctional requirements**.

**Step 2.2:** Calculate the **rated value of each factor**.

For each of the 13 Factors, assess the project and rate from **0** (**irrelevant**) to **5** (**very important**)

**Step 2.3:** Calculate the **Impact of the Factor** from **Impact Weight** of the Factor and the **Rated Value** for the project as:

**Impact of the Factor = Impact Weight (from the table) × Rated Value**

$$I = W \times R$$

**Step (2.4):** Calculate the **sum of Impact of all the Factors**. This gives the **Total Technical Factor (TFactor)** as given in table below:

**Step 2.5:** Calculate the **Technical Complexity Factor (TCF)** as:

$$TCF = 0.6 + (0.01 \times TFactor)$$

**Step 3: Adjust For Environmental Complexity**

**Step 3.1:** The **8 Environmental Factors** that affect the project execution and their corresponding Weights as given in the following

Factor	Description	Weight
F1	Familiar with the project model that is used	1.5
F2	Application experience	.5
F3	Object-oriented experience	1.0
F4	Lead analyst capability	.5
F5	Motivation	1.0
F6	Stable requirements	2.0
F7	Part-time staff	-1.0
F8	Difficult programming language	-1.0

**Step 3.2:** For each of the 8 Factors, assess the project and **rate from 0** (**irrelevant**) to **5** (**very important**).

**Step 3.3:** Calculate the **Impact of the Factor** from **Impact Weight** of the Factor and the **Rated Value** for the project as:

$$\text{Impact of the Factor} = \text{Impact Weight} \times \text{Rated Value}$$

**Step 3.4:** Calculate the sum of Impact of all the Factors. This gives the **Total Environment Factor (EFactor)** as given in the following **table**.

**Step 3.5:** Calculate the **Environmental Factor (EF)** as:

$$EF = 1.4 + (-0.03 \times EFactor)$$

**Step 4: Calculate Adjusted Use-Case Points (UCP) as:**

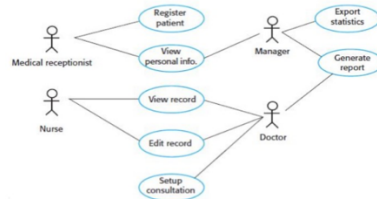
$$UCP = UUCP \times TCF \times EF$$



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" نمشي خطوه خطوه مثال بسيط ومن سكتشن ٣ "

In the use cases of the **mental care system** given that the use cases **View patient information**, and **View record** are simple use cases, **Register patient**, **Edit record** and **Export statistics** are average use cases, **Setup consultation**, and **Generate report** are complex use cases. The **Medical receptionist** and **Nurse actors** are interacting with the system through **API** while the **Manager**, and **Doctor** Use cases are interacting through **GUI**. Calculate the Unadjusted use case points for this system (UUCP).



17

Let's break it all down okay ?

- The question need the **Unadjusted use case points "UUCP"**.
  - ✦ Determine Unadjusted Use-Case Weight
  - ✦ Determine Unadjusted Actor Weight
  - ✦ Calculate Unadjusted Use-Case Points
- Which means we need to get
- Let's determine the UUCW from the question okay ?
- From the question I know that we 2 simple , 3 average and 2 complex
- $2 * 5 + 3 * 10 + 2 * 15 = 70$  this is the UUCW
- Now the UAW
- From the question we got 2 simple and 2 complex and 0 average why ?
- Anything interacts with api is simple , and gui is complex .
- So  $2 * 1 + 0 * 2 + 2 * 3 = 8$
- Now lets calculate the  $UUCP = UUCW + UAW = 70 + 8 = 78$

Another example okay ?

Consider the **13 Factors** that contribute to the impact of the **Technical Complexity** of a project on **Use-Case Points** and their corresponding **Weights** as given in the following table:

For the **mentcare system** if you know that the **code must be reusable**, and the **application should be easy to install, use, and change**. Also the **application should be portable and include special user training facilities**. Estimate the rated values for the relevant factors and **calculate the total technical factor TFactor** and then calculate the **Technical Complexity Factor (TCF)** as:  
 **$TCF = 0.6 + (0.01 \times TFactor)$**

Factor	Description	Weight
T1	Distributed System	2.0
T2	Response time or throughput performance objectives	1.0
T3	End user efficiency	1.0
T4	Complex internal processing	1.0
T5	Code must be reusable	1.0
T6	Easy to install	.5
T7	Easy to use	.5
T8	Portable	2.0
T9	Easy to change	1.0
T10	Concurrent	1.0
T11	Includes special security objectives	1.0
T12	Provides direct access for third parties	1.0
T13	Special user training facilities are required	1.0

## Software Cost Estimation Chapter 2

Let's understand the question okay ?

- a- The question needs the TF then The TFC , to get the TFC we need the TF first okay?
- b- We have only 6 mention factors ? so we just count them okay ?

Factor	Description	Weight (W)	Rated value (RV) (0 to 5)	Impact factor $I = W \times RV$
$T_5$	Code must be reusable	1	5	5
$T_6$	Easy to install	0.5	4	2
$T_7$	Easy to use	0.5	4	2
$T_8$	Portable	2	3	6
$T_9$	Easy to change	1	4	4
$T_{13}$	Special user training facilities are required	1	3	3
Total technical factor TFactor				22

- c-
- d- Every factor has a weight and the rated value from 0 to 5 I must estimate it 0 is lowest and 5 is highest
- e- So we get the impact factor then the summation of all of them which is 22
- f- So TF is 22 now we can get the TCF from the rule

And so on .

“ just break the question down and everything will be cool okay? “

16- UCP is useful for initial estimate but they are much less useful in driving the iteration to iteration work of a team.

- a- True
- b- False

Answer : a.

17- \_\_\_\_\_ is an interactive forecasting method which relies on a panel of experts.

- a- Wideband delphi estimation method
- b- Dolphin estimation method
- c- None
- d- Both

Answer : a.

18-The summary of the experts overcasts must provide an anonymous summary.

- a- True
- b- False

Answer : a.

19- In Wideband Delphi Technique, the estimation team comprise the project manager, moderator, experts, and representatives from the development team, constituting a 3-7 member team.

- a- True
- b- False

Answer : a.

## Software Cost Estimation Chapter 2

20-the first step at the wideband delphi technique is \_\_\_\_.

- a- Kickoff meeting by the moderator (2)
- b- Choosing the estimation team and the moderator
- c- Each estimation team member individually generates a detailed WBs (3)
- d- The moderator calls the estimation team for estimation meeting.(4)

Answer : b.

21- The last step of wideband delphi estimation method the project manger assembles the results from the estimation meeting.

- a- True
- b- False

Answer : a.

22-Wideband Delphi technique is a consensus based estimation technique for estimating efforts.

- a- True
- b- False

Answer : a.

23- Which of the following is a point of the Three points estimation method ?

- a- The most optimistic estimate (o)
- b- Most likely estimate (m)
- c- Pessimistic estimate (least likely estimate L)
- d- All above

Answer : d.

“The next page have some rules :D “ don’t worry all will be given at the exam”

## Software Cost Estimation Chapter 2

- ✧ **Three-point Estimate (E)** is based on the **simple average** and follows **triangular distribution**.

$$E = (O + M + L) / 3$$

### Standard Deviation

In **Triangular Distribution**,

$$\text{Mean } E = (O + M + L) / 3$$

$$\text{Standard Deviation} = \sqrt{[(O - E)^2 + (M - E)^2 + (L - E)^2] / 2}$$

### Three point Estimation Steps:

**Step 1:** Arrive at the WBS (Wideband Delphi Estimation Sheet).

**Step 2:** For each task, find three values – most optimistic estimate (O), a most likely estimate (M), and a pessimistic estimate (L).

**Step 3:** Calculate the Mean of the three values.

$$\text{Mean } E = (O + M + L) / 3$$

**Step 4:** Calculate the Three-point Estimate of the task. **Three-point Estimate is the Mean**. Hence,

$$E = \text{Mean} = (O + M + L) / 3$$

**Step 5:** Calculate the Standard Deviation of the task.

$$\text{Standard Deviation (SD)} = \sqrt{[(O - E)^2 + (M - E)^2 + (L - E)^2] / 2}$$

**Step 6:** Repeat Steps 2, 3, 4 for all the Tasks in the WBS.

**Step 7:** Calculate the Three-point Estimate of the project.

$$E (\text{Project}) = \sum E (\text{Task})$$

**Step 8:** Calculate the Standard Deviation of the project.

$$SD (\text{Project}) = \sqrt{(\sum (SD (\text{Task}))^2)}$$

24- Actually the three point estimate E and the standard deviation SD thus calculated are used to convert the project estimates to **Confidence levels**.

- a- True
- b- False

Answer : a.

25- \_\_\_\_ estimation considers three values: the most optimistic estimate (O), a most likely estimate (M), and a pessimistic estimate (least likely estimate (L)).

- a- Three Point Estimation
- b- Wideband delphi
- c- PERT ( Project evaluation and review technique )
- d- None

Answer : c

## Software Cost Estimation Chapter 2

Basic rule at PERT

*The most-likely estimate (M) is weighted **4 times** more than the other two estimates (optimistic (O) and pessimistic (L)).*

**PERT Estimate (E)** is based on the **weighted average** and follows beta distribution.

$$E = (O + 4 \times M + L)/6$$

26- Research and development (R&D) is when businesses gather knowledge to create new products or discover new ways to improve their existing products and services

- a- True
- b- False

Answer : a .

27- \_\_\_\_\_ , uses a similar past project info to estimate the duration or cost of your current project and these is limited info .

- a- PERT
- b- Wideband delphi
- c- Analogous
- d- None

Answer : c.

28-Analogous estimation requires :

- a- Data form previous and ongoing projects
- b- Work hours per week for each member
- c- Costs involved to get the project completed
- d- All above

Answer : d .

“ The analogous estimation , you can say it really relies on old work and every details of it it's really good for initial stages at projects and simple and estimates the effort and duration of individual tasks you can use it in WBS when you estimate tasks as well “

“The chapter has really a lot of information , tried my best to get in my opinion what really could be a question “

“Thank you and sorry if there are a lot of pages :D , good luck “

## Cost Estimation Chapter 2 – Part 2

1-Function point is a unit of measurement to express the amount of business functionality and information system as a product provides to a user .

- a- True
- b- False

Answer :a .

2- An example of functional size measurement method \_\_\_\_ .

- a- COSMIC
- b- FiSMA
- c- Both
- d- None

Answer : c .

3- \_\_\_\_ is the smallest unit of functional user requirement .

- a- Elementary School
- b- Elementary Process
- c- High process
- d- None

Answer : b . note “ it’s meaningful to the user”

4- \_\_\_\_ is /are an example of data functions .

- a- Internal logical files ILF
- b- External interface files EIF
- c- Both
- d- None

Answer : c, note “ data functions are made up of internal and external resources that affect the system “

5- A logical file might consist of a \_\_\_\_ .

- a- Single flat file
- b- Single table
- c- Relational database
- d- All above

Answer : d.

6- \_\_\_\_ is a user identifiable group of logically related data or control info that is used by the app for reference purposes only .

- a- ILF
- b- EIF
- c- Both
- d- None

Answer : b .

## Cost Estimation Chapter 2 – Part 2

- 7- \_\_\_\_\_ can contain business data , control data and rules based data .
- a- ILF
  - b- EIF
  - c- Both could be
  - d- None

Answer : c, note “ example, telephone switching “

- 8-Telephone switching is made of \_\_\_\_.
- a- Business data
  - b- Rule data
  - c- Control data
  - d- All above

Answer : d.

- 9- \_\_\_\_\_ data is the actual call .
- a- Business data
  - b- Rule data
  - c- Control data
  - d- None above

Answer : a

- 10- \_\_\_\_\_ is how the call should be routed through the network .
- a- Business data
  - b- Rule data
  - c- Control data
  - d- None above

Answer : b.

- 11- \_\_\_\_\_ Is a type of transaction functions .
- a- External inputs
  - b- External outputs
  - c- External inquiries
  - d- All above

Answer : d. note “ transaction functions are made up of process that are exchanged between the user and the external apps and apps being measured “

- 12- \_\_\_\_\_ is a transaction function in which data goes into the app from outside the boundary to inside .
- a- External inputs
  - b- External outputs
  - c- External inquiries
  - d- All above

Answer : a .

## Cost Estimation Chapter 2 – Part 2

13- Screens , forms , dialog boxes or control signals through which an end user or other program adds or deletes changes a programs' data is related to \_\_\_\_ .

- a- External inputs
- b- External outputs
- c- External inquiries
- d- All above

Answer : a.

14- \_\_\_\_ is a transaction function in which data comes out of the system .

- a- External inputs
- b- External outputs
- c- External inquiries
- d- All above

Answer : b.

15- \_\_\_\_ is a transaction function with both input and output components that result in data retrieval .

- a- External inputs
- b- External outputs
- c- External inquiries
- d- All above

Answer : c.

16- \_\_\_\_ is the largest user identifiable subgroup of elements within an ILF or an EIF.

- a- RET " Record element type "
- b- DET "" Data element type "
- c- FTR " File type referenced "
- d- None

Answer : a.

17- \_\_\_\_ is the largest user identifiable subgroup within the EI,EO , or EQ .

- a- RET " Record element type "
- b- DET "" Data element type "
- c- FTR " File type referenced "
- d- None

Answer : c . note " The transaction functions actually measured by b and c "

18- EI,EO,EQ are measured by counting FTRs and DETs , that they containing following counting rules .

- a- True
- b- False

Answer : a.



## Cost Estimation Chapter 2 – Part 2

19- Data functions ILF and EIF are measured by counting DETs and RETs .

- a- True
- b- False

Answer :a .

20- \_\_\_\_ is a type of function points counts .

- a- Development
- b- Application
- c- Enhancement
- d- All above

Answer :d .

21- \_\_\_\_ function point count can be counted at all phases of a development project from requirement to implementation stage.

- a- Development
- b- Application
- c- Enhancement
- d- All above

Answer :a .

22- \_\_\_\_ function point count , when changes are made to software after production .

- a- Development
- b- Application
- c- Enhancement
- d- All above

Answer :c.

23- At FP counting process the first step is to determine the type of count .

- a- True
- b- False

Answer : a.

24- Data function shall be classified as \_\_\_\_ , if it's maintained by the app being measured.

- a- ILF – internal logical file
- b- EIF – External interface file
- c- Both
- d- None

Answer : a.

## Cost Estimation Chapter 2 – Part 2

25- Data function shall be classified as \_\_\_\_ if it's referenced but not maintained by the app being measured.

- a- ILF – internal logical file
- b- EIF – External interface file
- c- Both
- d- None

Answer : b.

26- EQ- External inquiry is an elementary process that send data or control info outside the boundary , the processing logic contains **no** mathematical formula or calcs .

- a- True
- b- False

Answer : a.

27- Development function point counts consists of \_\_\_\_ .

- a- Application Functionality
- b- Conversion Functionality
- c- Both
- d- None

Answer : c. note “ DFP = ADD + CFP “

28- VAF can vary from 0.65 to 1.35 which influences of +- 35% on the final adjusted FP count.

- a- True
- b- False

Answer: a.

29- A benefit of function points \_\_\_\_.

- a- Measuring the size of the solution instead of the size of the problem
- b- Requirements are the only needed thing
- c- Both
- d- None

Answer :c.

“Thank you and good luck “

## Cost Estimation Chapter 2 – Part 3

1-Work break down structure - WBS is a deliverable-oriented decomposition of a project into smaller components .

- a- True
- b- False

Answer : a.

2-WBS element could be a \_\_\_\_.

- a- Product
- b- Data
- c- Service
- d- All above

Answer : d.

3- WBS is represented as a sequence list of project's work activities.

- a- True
- b- False

Answer : b, explanation “ as a hierarchical list “

4- \_\_\_\_ is a format of WBS

- a- Outline view
- b- Tree structure view
- c- Both
- d- None

Answer : c.

5- \_\_\_\_ is user friendly and presents a good view of the entire project and allows easy modifications as well.

- a- Outline view
- b- Tree structure view
- c- Both
- d- None

Answer : a. note “ tree structure presents an entire view as well “

6- \_\_\_\_ is a type of WBS .

- a- Functional
- b- Activity
- c- Both
- d- None

Answer : c.

## Cost Estimation Chapter 2 – Part 3

7-\_\_\_\_ , the system is broken based on the functions in application to be developed .

- a- Functional WBS
- b- Activity WBS
- c- Both
- d- None

Answer : a.

8- in Activity WBS the system is broken based on activities in the systems .

- a- True
- b- False

Answer : a.

9-\_\_\_\_\_ : a task that must occur before another is said to have \_\_\_\_\_ of the other .

- a- Precedence
- b- Concurrence
- c- Critical path
- d- None

Answer : a .

10- \_\_\_\_\_ , tasks are those that can occur at the same time in parallel.

- a- Precedence
- b- Concurrence
- c- Critical path
- d- None

Answer : b.

11- Critical path is a specific set of sequential tasks upon which. The project completion date depends.

- a- True
- b- False

Answer : a.

12- Critical Path Method -CPM is the process for determining and Optimizing the critical path .

- a- True
- b- False

Answer :a , note “ non-critical path tasks can start earlier or later without impacting the completion date “

13- The project completion date is not based on the training, documentation and deployment. Such tasks are called non-critical.

- a- True
- b- False

Answer : a .

## Cost Estimation Chapter 2 – Part 3

14- \_\_\_\_ dependency relationship , Task b Cannot start until task A is completed.

- a- Finish to start
- b- Finish to finish
- c- Both
- d- None

Answer : a.

14- In \_\_\_\_ task dependency relationship, Task B cannot finish till Task A is completed.

- a- Finish to start
- b- Finish to finish
- c- Both
- d- None

Answer : b.

15- \_\_\_\_ are the critical stages in your schedule .

- a- Issue
- b- Task
- c- Milestone
- d- None

Answer : c.

16- An advantage of estimating using WBS \_\_\_\_.

- a- More accurate cost and schedule estimates
- b- Provides basis for task assignments
- c- Both
- d- None

Answer : c.

17- What are then umber of test cases if FP = 10.

- a- 10
- b- 12
- c- 14
- d- 16

Answer : b .

18-Functional points indicate the functionality of software app from the user's perspective and is sued as a technique to estimate the size of a software project.

- a- True
- b- False

Answer : a.

## Cost Estimation Chapter 2 – Part 3

19-In testing , estimation is based on requirement specification document .

- a- True
- b- False

Answer : a.

20- \_\_ is related to unadjusted data function points .

- a- Internal files
- b- External interfaces
- c- Both
- d- None

Answer : c.

21- \_\_\_\_\_ is related to unadjusted transaction function points .

- a- User inputs
- b- User outputs
- c- User inquiries
- d- All above

Answer : d.

“ Thank you and good luck at the midterm 😊 “

## Cost Estimation – Chapter 3 – Part 1

1- \_\_\_\_ measure is the most common size measure used for estimation .

- a- Use cases
- b- Lines of code
- c- Web pages
- d- None

Answer : b .

2- \_\_\_\_ is an advantage of lines of code in size estimation.

- a- Data on lines of code for past projects is easily collected
- b- Lots of historical data already exists
- c- Most commercial estimation tools their base effort estimates on lines of code
- d- All above

Answer : d.

3-Lines of code can't be used as basis for estimating an individual's task assignments because of the vast differences in productivity between different programmers.

- a- True
- b- False

Answer : a.

4-Lines of code are easy to estimate directly .

- a- True
- b- False

Answer : b, explanation “ they're difficult to estimate directly , must be estimated by proxy”

5-Function point estimation can be used to estimate size in a projects in \_\_\_\_ stages.

- a- Early
- b- Late
- c- Could be any time
- d- None

Answer : a.

6-The number of function points in a program is based on the number and complexity of External inputs , External outputs , external queries , Internal logical files and external interface files.

- a- True
- b- False

Answer : a.

7-External inputs such as screens , forms , dialog boxes or control signals.

- a- True
- b- False

Answer : a.

## Cost Estimation – Chapter 3 – Part 1

8-The influence multiplier ranges from \_\_\_\_ to 1.35 .

- a- 0.35
- b- 0.65
- c- 1
- d- 1.1

Answer : b .

9-The Dutch method suggests an Indicative method which counts all input , outputs and queries

- a- True
- b- False

Answer : b, explanations “ counts only Internal logical files and External Interface files “

**IndicativeFunctionPointCount =**

**(35 × InternalLogicalFiles) + (15 × ExternalInterfaceFiles)**

10-Dutch method is \_\_\_\_ accurate than full function point counting technique .

- a- More
- b- Less
- c- Same
- d- None

Answer : b, note “ it’s less accurate but requires lower effort as well “

Note “ If you do have data on **your** organization’s historical productivity, you should use that data to convert your size estimates to effort estimates **instead** of using industry-average data.”

The following example is worth to read , read it well please :

### Computing Effort from Size



Project	Size (LOC)	Schedule (Calendar Months)	Effort (Staff Months)	Productivity (LOC/Staff Month)	Comments
Project A	33,842	8.2	21	1,612	
Project B	97,614	12.5	99	986	
Project C	7,444	4.7	2	3,722	Not used—too small for comparison
Project D	54,322	11.3	40	1,358	
Project E	340,343	24.0	533	639	Not used—too large for comparison

**Table 3-6 Example of Past Project Productivities for Use as the Basis of an Effort Estimate**

- Suppose you’re estimating the effort for **a new business system**, and you’ve estimated the size of the new software to be **65,000 to 100,000 lines of Java code**, with a **most likely size of 80,000 lines of code**.
- **Project C is too small** to use for comparison purposes because it is **less than 1/3 the size of the low end of your range**, and **Project E is too large** because it is **more than 3 times the top end of your range**.
- Thus your relevant historical **productivity range is 986 LOC per staff month (Project B) to 1,612 LOC per staff month (Project A)**.

Dividing the **lowest end** of your size range by the **highest productivity** rate gives a low estimate of 40 staff months (**65000/1612 = 40**).

Dividing the **highest end** of your size range by the **lowest productivity** gives a high estimate of 101 staff months (**100000/986 = 101**). **Your estimated effort is 40 to 101 staff months.**



## Cost Estimation – Chapter 3 – Part 1

“The next 20 slides I think they are just read only “

11- Which method among the four approaches tends to give more weight to historical data?

- a- Using estimation software
- b- Informal comparison to past projects
- c- Using industry average graphs
- d- Using the ISBSG method

Answer : b.

12- What is a key consideration when using estimation software?

- a- Project size
- b- Industry average data
- c- Historical data calibration
- d- All above

Answer : c .

13- What is the emphasis when looking for convergence or spread among estimates?

- a- Techniques using industry-average data
- b- Techniques with historical data
- c- Techniques with maximum team size variations
- d- Techniques producing the most accurate results

Answer : d . explanation : “ The emphasis should be on techniques that tend to produce the most accurate results when looking for convergence or spread among estimates.”

“Thank you “

## Cost Estimation – Chapter 3 – Part 2

1-We use the Basic Schedule equation to estimate schedule early in medium to large projects.

- a- True
- b- False

Answer : a. Note “ it’s not intended for estimation of small or later projects “

$$\text{EstimatedSchedule} = \text{PastSchedule} \times (\text{EstimatedEffort} / \text{Past Effort})^{1/3}$$

The following formula is related to Informal comparison to past projects

2- The exponent of 1/3 is used for \_\_\_\_ .

- a- Small projects
- b- Medium to large projects
- c- Both
- d- None

Answer : b , note “ more than about 50 staff months )

3- For smaller projects we should use an exponent of 1/2.

- a- True
- b- False

Answer : a.

4- Use First-Order Estimation Practice to produce a \_\_\_\_-accuracy (but very low-effort) schedule estimate early in a project.

- a- High
- b- Low
- c- Medium
- d- None

Answer : b .

5- Shorter schedules requires less effort.

- a- True
- b- False

Answer : b, explanation : Shorter schedules requires more effort .

6- Shortest possible schedule is also the point at which error production is the \_\_\_\_ .

- a- Lowest
- b- Highest
- c- Worst
- d- None

Answer : b.

## Cost Estimation – Chapter 3 – Part 2

7- Larger teams have more coordination overhead and communication paths, leading to more errors.

- a- True
- b- False

Answer : a.

8-What does Basic schedule equation estimate early in a project ?

- a- Budget
- b- Duration
- c- Team size
- d- Features

Answer : b .

9- Why do shorter schedules require more effort?

- a- Smaller teams require more coordinations
- b- Larger teams introduce more communication paths
- c- Larger teams require more management overhead
- d- All above

Answer : d.

10- What is the consensus among researchers regarding schedule compression of more than 25% from nominal?

- a- It's effective and recommended
- b- Its impossible and not recommended
- c- It has no impact on total effort
- d- None

Answer : b.

11- Extending schedule beyond the nominal schedule reduces total effort, if you reduce team size.

- a- True
- b- False

Answer : a.

12- What is the key condition for an extended schedule to reduce effort?

- a- Increasing team size
- b- Reducing team size
- c- Allocating the same people fractionally
- d- Reducing feature set

Answer : b.

## Cost Estimation – Chapter 3 – Part 2

13- What is the recommended strategy for reducing costs in a project?

- a- Shortening the schedule
- b- Lengthening the schedule
- c- Maintaining the nominal schedule
- d- Increasing the team size

Answer : b . note “ Reducing costs can be achieved by lengthening the schedule and conducting the project with a smaller team.”

14- What caution is given about extending the schedule by more than about 30%?

- a- It has no impact on costs
- b- It may introduce inefficiencies and increase costs
- c- It improves productivity
- d- It reduces effort

Answer : b .

15- What is a potential pitfall of attempting to compress a schedule below the nominal?

- a- Decreased team size
- b- Increased team size
- c- Improved team
- d- Reduced costs

Answer : b .

16- What is the recommended economically optimal team size for medium-sized business-systems projects?

- a- 1 to 3 people
- b- 3 to 5 people
- c- 5 to 7 people
- d- 9 to 11 people

Answer : c .

17- For medium-sized business-systems projects, it is recommended to avoid increasing the team size beyond 7 people.

- a- True
- b- False

Answer : a.

18- What is the consequence of team size increasing to 15 to 20 according to the research findings?

- a- Schedule stays flat, effort decreases
- b- Schedule stays flat, effort increases dramatically
- c- Schedule decreases, effort stays flat
- d- Schedule and effort both decrease

Answer : b .

## Cost Estimation – Chapter 3 – Part 2

19- Which estimation method would not be used when better data is available?

- a- Basic Schedule Equation
- b- Informal Comparison to Past Projects
- c- First-Order Estimation Practice
- d- Software tool calibrated with historical data

Answer : c.

20- What is the primary purpose of the Basic Schedule Equation?

- a- To compare historical data
- b- To estimate team size
- c- To estimate schedule duration early in a project
- d- To evaluate industry-average data

Answer : c .

“Thank you and good luck with the finals and next exams 😊 “