Project:	{UTAorgs}
	CSE 5325 – Spring 2022
	Project Management
Module:	COCOMO
Deliverable:	COCOMO Estimate Report

Version: [1.0] **Date: [11/10/2022]**

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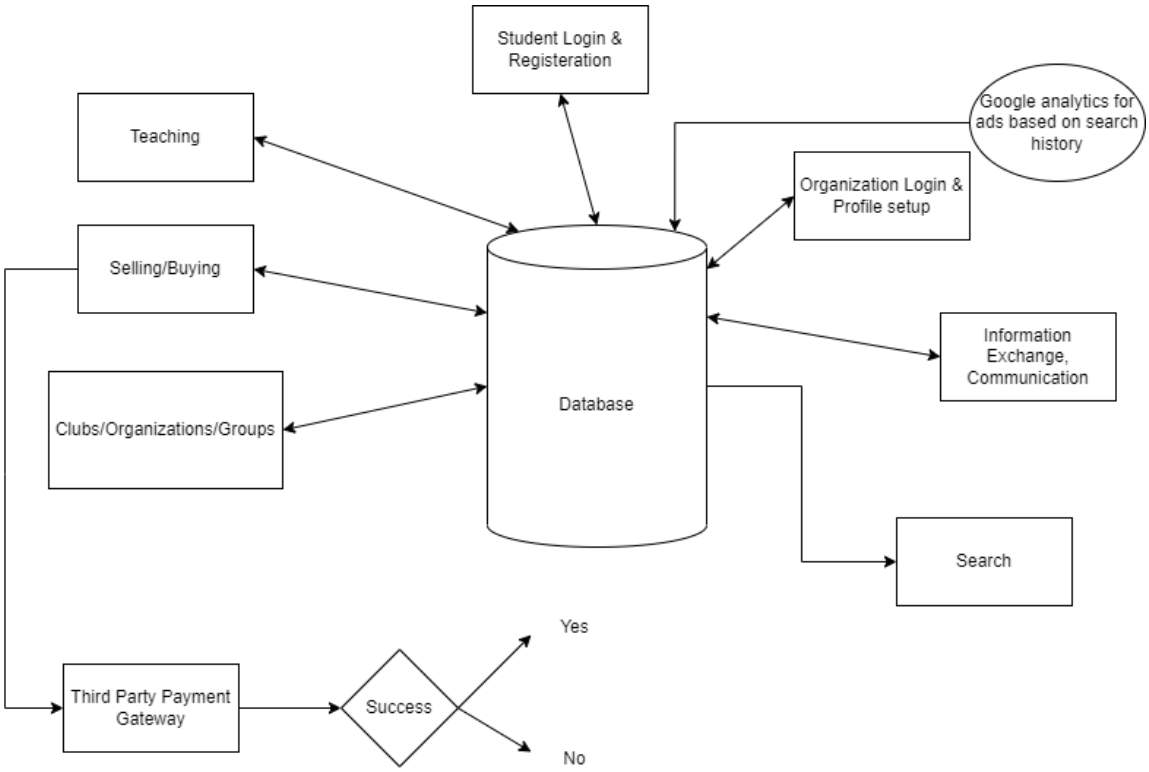
1. Introduction

UTAorgs is an app that is being developed to assist students in exchanging information, forming organizations/clubs, buying/selling/trading goods, and profiting from this product, which will be available on both web and android devices.

It will include features that allow students to exchange information, form organizations/clubs, buy/sell/trade goods, and profit from this product.

The app will help students to communicate and interact easily with the help of creating various orgs and becoming members of those orgs. It will help students join groups of their interest, trade educational related stuff, merchandise of different orgs. Moreover, students can search for tutors for their studies. The app will also provide a space for advertisement from which a good amount of revenue can be generated.

1.1 Project Context Diagram



2. Estimating Factors

2.1 Source of Lines of Code

The following is the number of lines of code delivered as part of this project, A justification for the total amount of LOC is provided.

SLOC | Source Lines Of Code	Value Chosen: **5000**
Justification: The application to be built for 'UTAorgs: Student Information Exchange' requires comprehensive coding. It includes features that allow students to exchange information, form organizations/clubs, buy/sell/trade goods, and profit from this product. There are five developers on the team who will contribute approximately 1000 lines per developer to the codebase. Hence 5000 sources of lines of code.	

2.2 Scale Drivers

The following is the list of scale drivers, the values applicable to this project and a justification for each value chosen:

PREC | Precendentedness	Value Chosen: **Somewhat Unprecedented.**
Justification: A web and an android application are both being constructed. The development team is experienced in developing online applications; however, they are not as skilled in developing Android applications. The Precedentedness Scale Driver is therefore Somewhat Unprecedented.	

Development Flexibility	Value Chosen: **Some Relaxation**
Justification: The customer's requirements may alter, and this was taken into consideration during the project's development. Considering this, the scale driver for Development Flexibility is maintained as Some Relaxation.	

Architecture / Risk Resolution	Value Chosen: **Generally (75%)**
Justification: As they begin to develop the web app and mobile Android app, the team has a clearly defined architecture. As part of the agile development approach, the team also employs a software architect who provides guidance on the architecture for each iteration. As a result, the Architecture/Risk Resolution is selected as Generally (75%)	

Team Cohesion	Value Chosen: **Largely Cooperative**
Justification: Cohesion within the development team is strong. Over two years have passed since they started working together, and they are well acquainted. Because of their strong bonds, Largely Cooperative was selected as the scale driver for Team Cohesion.	

Process Maturity	Value Chosen: **SEI CMM Level 2**
Justification: The development of the applications is presently only at the "Repeatable" phase. The development team can repeat the procedures for creating the Student Information Exchange System because it has already created a few applications. Therefore, SEI CMM Level 2 is chosen as the scale driver for Process Maturity.	

2.3 Cost Drivers

The following is the list of cost drivers, the values applicable to this project and a justification for each value chosen:

ACAP | Analyst Capability	Value Chosen: **Very High**
Justification: One software architect/analyst who will assist the team with software architecture already exists on the development team. The development team's analyst capability is quite good thanks to the inclusion of the software architect. I also anticipate that the agile methodology will aid in preventing communication gaps through customer collaboration. As a result, the analytical capability is Very High.	

APEX | Application Experience Cost Driver	Value Chosen: **High**
Justification: Development of web applications is experience for the development team. Though it currently lacks some experience in the field of mobile app development, it also has some fundamental knowledge of the production of mobile apps. Consequently, I have assumed that the APEX driver is High.	

PCAP | Programmer Capability Cost Driver	Value Chosen: **High**
Justification: It serves as a gauge of the project's programmers' competence. The programmers in the development team have experience working on similar projects. I therefore assumed that the programmer's skill was High.	

PLEX | Platform Experience Cost Driver	Value Chosen: **High**
Justification: The team's interaction with the platform is measured. The PLEX driver is set to High because the development team is experienced in working on web development projects.	

LTEX | Language and Tool Experience	Value Chosen: **High**
Justification: Because the development team has some programming experience and has completed a few web development projects in the past, the LTEX driver, which measures the team's experience with language and tools, is assumed to be High.	

PCON | Personnel Continuity Cost Driver	Value Chosen: **High**
Justification: This driver assesses personnel retention with the current organization. Because our development team has been with us for the last three years, I assumed this driver was High.	

TOOL | Use of Software Tools	Value Chosen: **Nominal**
Justification: It calculates the number based on the complexity of the tools that the team will use to develop the project. The development team uses basic tools for development and content management. It is not utilizing mature life-cycle tools. As a result, the value of this cost driver is set to Nominal.	

SITE | Multisite Development Cost Driver	Value Chosen: **Extra High**
Justification: Because the entire team is housed in one office, the SITE cost driver has been set to Extra High for this project.	

SCED | Development Schedule Cost Driver	Value Chosen: **Very Low**
Justification: The development schedule is tight because the project is expected to be completed in three months. If SCED is set to low, the schedule is compressed, and extra effort is required. As a result, to reduce the time to delivery, I set SCED to Very Low.	

TIME | Execution Time Constraint Cost Driver	Value Chosen: **High**
Justification: It represents the amount of CPU time that the software will consume. Because it is a web application, we have set the execution time constraint to High.	

STOR | Main Storage Constraint Cost Driver	Value Chosen: **Nominal**
Justification: It is determined by the amount of main memory that the software will use. Because our project is not data intensive, I have designated it as Nominal.	

PVOL | Platform Volatility Cost Driver	Value Chosen: **Low**
Justification: It is a metric that indicates how frequently the platform changes due to updates or other factors. We will not change the platform because we have defined the architecture in advance. As a result, I have assumed that platform volatility is low.	

RELY | Required Reliability Cost Driver	Value Chosen: **Nominal**
Justification: It is a measurement based on the consequences of the software malfunction. Our project will not suffer significantly from a software failure. I have therefore designated the required reliability as Nominal.	

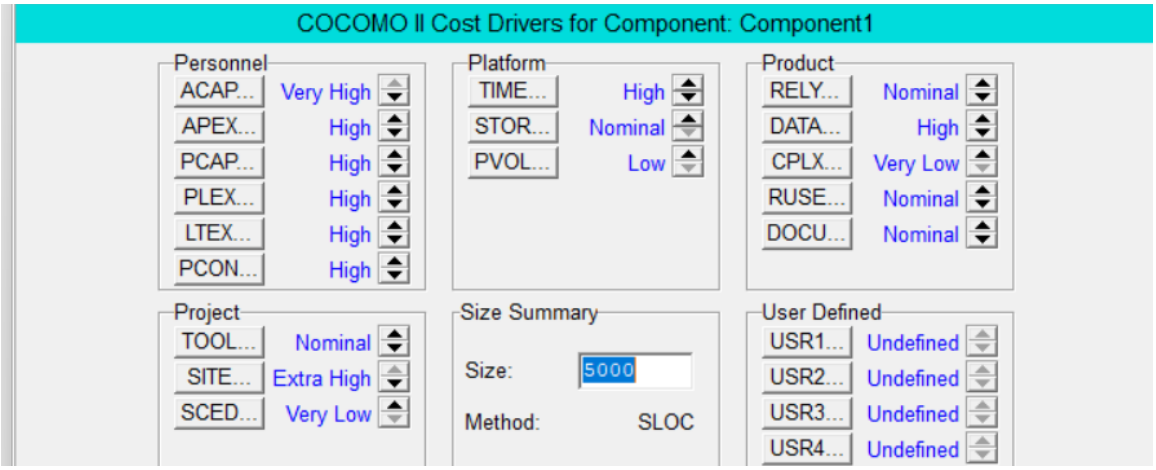
DATA | Database Size Cost Driver	Value Chosen: **High**
Justification: Our project will necessitate large amounts of data from a university database. The DATA cost driver is determined by the size of the database used in the project. As a result, I rated the database size cost driver as High.	

CPLX | Product Complexity Cost Driver	Value Chosen: **Very Low**
Justification: This cost driver is significant when we are working on a highly complex project. Because our project will be simple to develop and use, we have set the Product Complexity Cost Driver to Very Low.	

RUSE | Required Reusability Cost Driver	Value Chosen: **Nominal**
Justification: This cost driver assesses the reusability of our project software. Because our project will not be reused extensively across the product line, we have set the Required Reusability Cost Driver to Nominal.	

DOCU | Documentation match to life-cycle needs	Value Chosen: **Nominal**
Justification: The DOCU cost driver is determined by the project's documentation. We have not gone to great lengths to document the project. We will document the project in its most basic form. Hence The driver Documentation match to life-cycle needs is set to Nominal.	

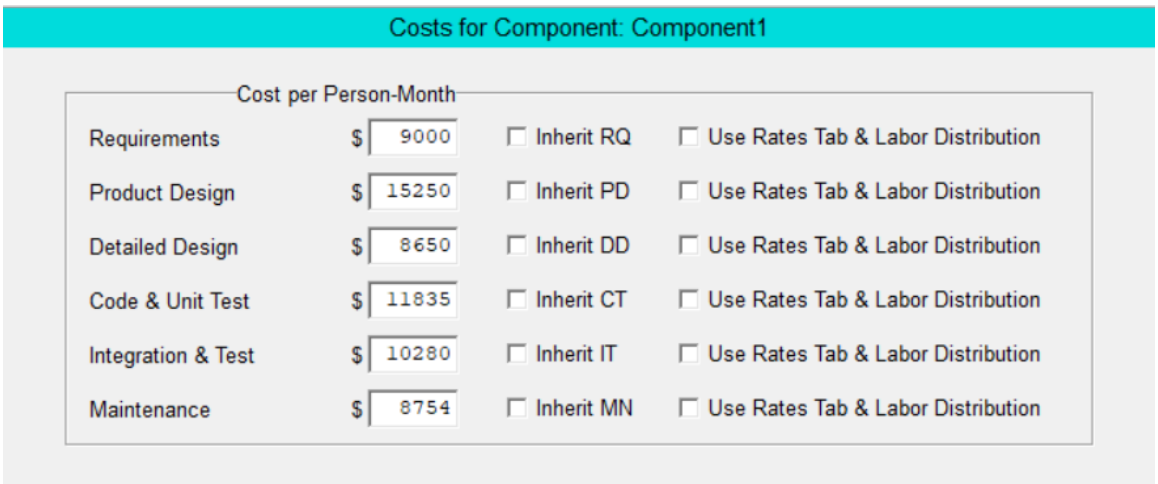
<u>COCOMO Cost Drivers:</u>



3. Project Final Timeline and Cost Structure:

3.1 Previous Cost & Work Estimate:

Schedule	7 September 2022 – 7 December 2022
Cost	$ 305,500
Work (Total days)	61



Above values are calculated for Agile methodology considering Microsoft Project Plan calculations from Assignment 2:

Requirements = Sum of requirements of all iterations

Product Design = Sum of product high level design initially

Detailed Design = Sum of design of all iterations

Code & Unit Test = Sum of development and verification & validation testing of all iterations

Integration & Test = Sum of deployment and acceptance testing of all iterations

Maintenance = Sum of iteration feedback from client of all iterations

3.2 Cost Estimate:

COCOMO Cost Estimate	$ 74,200
Office Workspace	$ 40,000
Software Licenses	$ 5,750
Hardware (Workstations)	$ 12,500
Database & Servers	$ 27,500
Medical Insurance for the team	$ 52,500
Miscalleanous	$ 12,500
Subtotal	**$ 224,950**
Profit (100%)	**$ 225,000**
Total cost including profit	**$ 449,950**

Duration Estimate:

COCOMO Duration Estimate	5.1 months
COCOMO Efforts estimate	6.7 Person-months
Vacation for team members	One week (0.25 months)
Total Duration for Project	**5.2 months**

3.3 PROJECT REPORTS BY COCOMO:

1. **Activity Report:**

UTAorgs - Activity Report

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UTAorgs - Activity Report

SystemStar 3.0 Demo November 10, 2022 19:44:24 Page: 1

Estimate Name:	UTAorgs	Estimate ID:	
Model Name:	COCOMO® II 2000	Model ID:	2000
Process Model:	COCOMO® II Model	Phases:	Waterfall

	Effort in Person-Months						
Activity	RQ	PD	DD	CT	IT	Total RQ to IT	MN
Requirements	0.2	0.1	0.1	0.1	0.0	0.5	0.0
Product Design	0.1	0.4	0.1	0.2	0.1	0.9	0.0
Programming	0.0	0.1	0.9	1.3	0.4	2.8	0.0
Test Plans	0.0	0.1	0.1	0.1	0.0	0.3	0.0
V & V	0.0	0.1	0.1	0.2	0.4	0.8	0.0
Project Office	0.1	0.1	0.1	0.2	0.1	0.6	0.0
CM/QA	0.0	0.0	0.1	0.2	0.1	0.4	0.0
Manuals	0.0	0.1	0.1	0.1	0.1	0.4	0.0
Totals	0.4	1.1	1.7	2.2	1.3	6.7	0.0

2. **Detail Report:**

UTAorgs - Detail Report

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UTAorgs - Detail Report

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Estimate Name:	UTAorgs	Estimate ID:	
Model Name:	COCOMO® II 2000	Model ID:	2000
Process Model:	COCOMO® II Model	Phases:	Waterfall

Component Name:	Component1	Component ID:	
Increment:	1	Level:	1
Developed Size:	5,000	EAF:	0.3767

Phase	Effort (Person-Months)	Cost (K$)	Duration (Months)	Staffing
RQ -- Requirements	0.4	3.9	0.7	0.6
PD -- Product Design	1.1	16.2	1.1	1.0
DD -- Detailed Design	1.7	14.3	1.0	1.6
CT -- Code & Unit Test	2.2	26.6	1.4	1.7
IT -- Integration & Test	1.3	13.2	0.9	1.4
Development (PD+DD+CT+IT)	6.2	70.3	4.4	
Totals (RQ+PD+DD+CT+IT)	6.7	74.2	5.1	
MN -- Maintenance (per year)	0.0	0.0		0.0

3. **Cost Driver Report:**

UTAorgs - Cost Driver Report

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UTAorgs - Cost Driver Report

SystemStar 3.0 Demo November 10, 2022 19:49:41 Page: 1

Estimate Name: UTAorgs
Model Name: COCOMO® II 2000
Process Model: COCOMO® II Model

Estimate ID:
Model ID: 2000
Phases: Waterfall

Component Name	EAF	ACAP	APEX	CPLX	DATA	PCAP	RELY	RUSE	SCED	STOR	TIME	TOOL	PLEX	LTEX	PCON	SITE	PVOL	DOCU
Component1	0.3767	VH	H	VL	H	H	N	N	VL	N	H	N	H	H	H	XH	L	N

4. **Cost Report:**

UTAorgs - Cost Report

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UTAorgs - Cost Report

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Estimate Name: UTAorgs
Model Name: COCOMO® II 2000
Process Model: COCOMO® II Model

Estimate ID:
Model ID: 2000
Phases: Waterfall

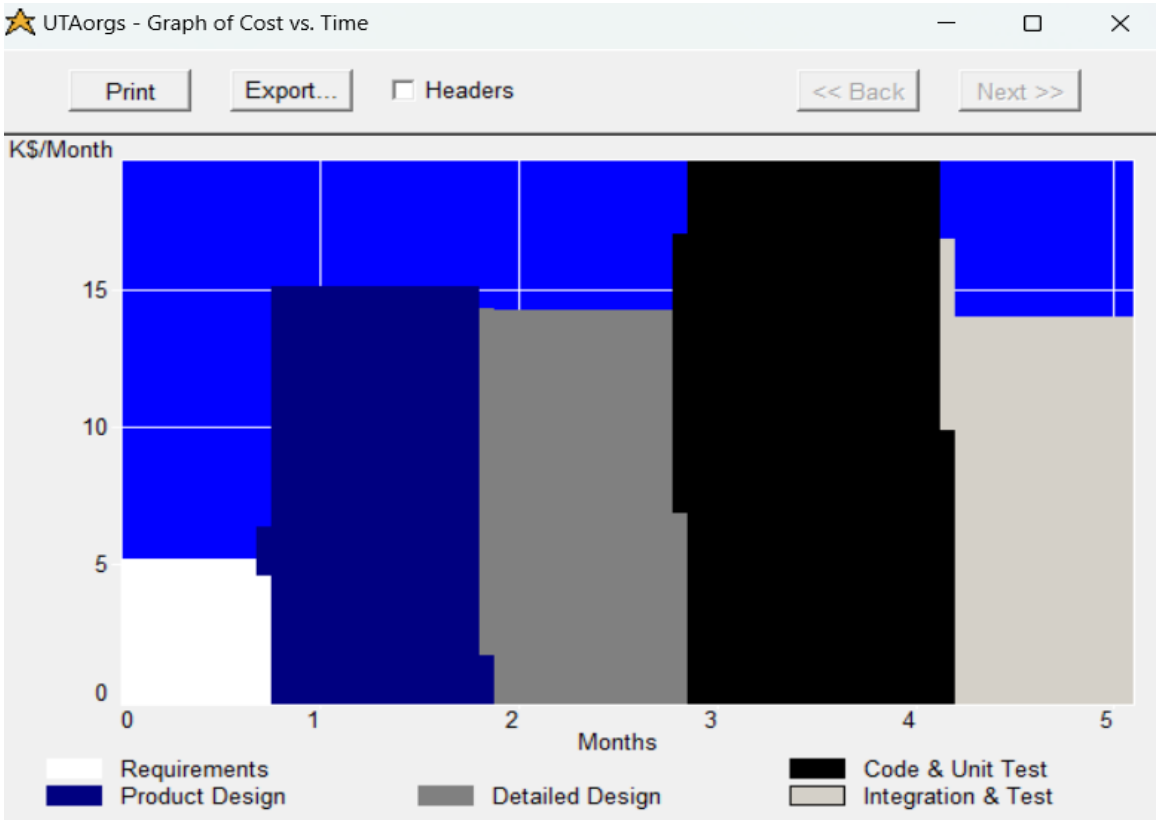
Cost per Component (K$)

Component Name	RQ	PD	DD	CT	IT	Total RQ to IT
Component1	3.9	16.2	14.3	26.6	13.2	74.2

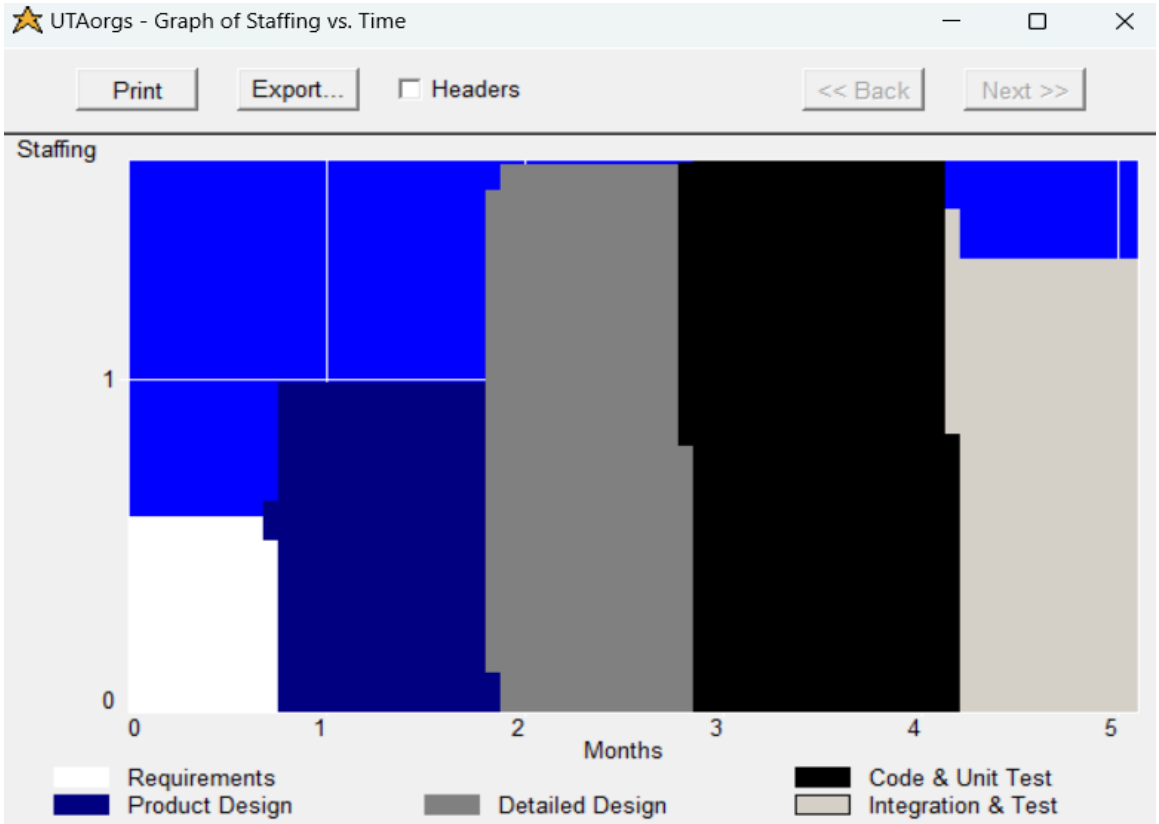
Cost Summary

Component Totals	3.9	16.2	14.3	26.6	13.2	74.2
Grand Total	3.9	16.2	14.3	26.6	13.2	74.2

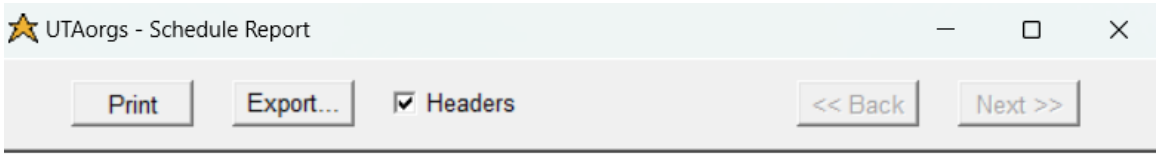
5. **Graph of Cost vs Time:**



6. **Graph of Staffing vs Time:**



7. **Schedule Report:**



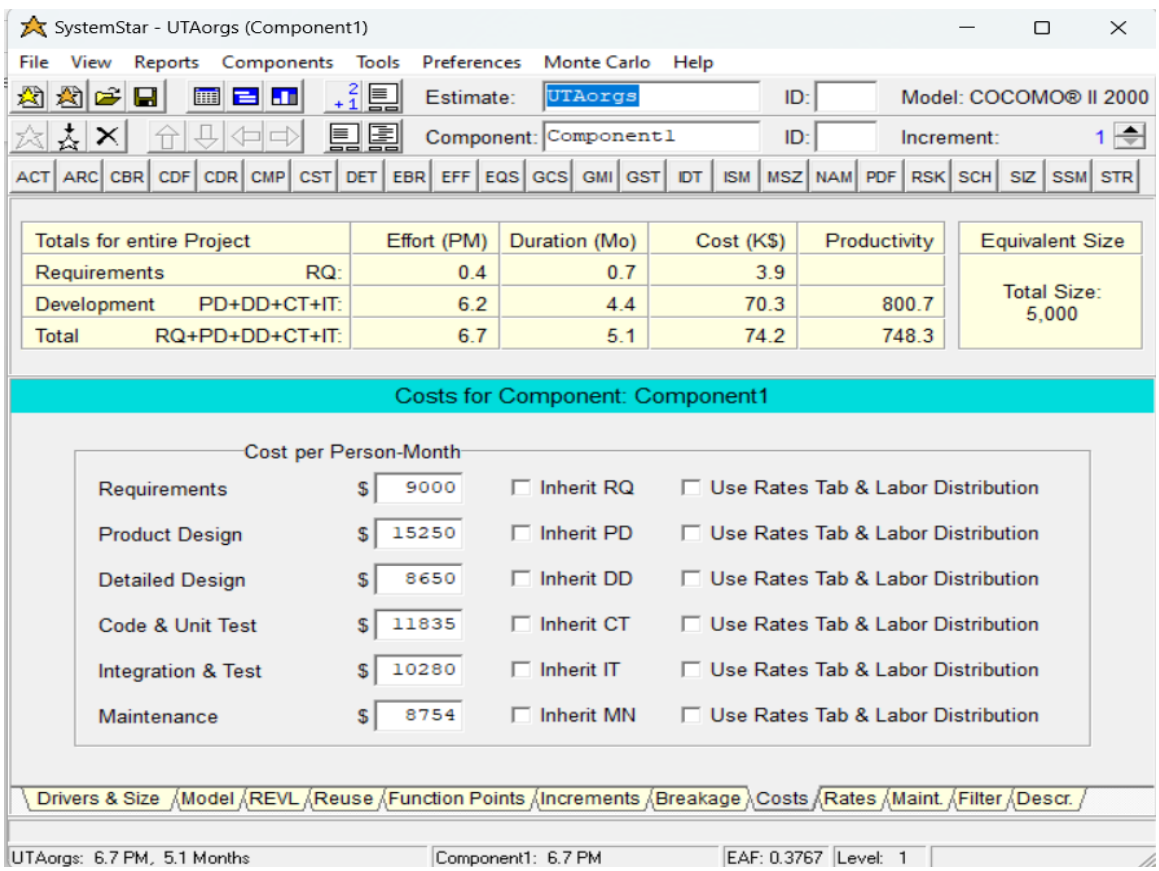
UTAorgs - Schedule Report

SystemStar 3.0 Demo November 10, 2022 19:55:20 Page: 1

Estimate Name: UTAorgs
Model Name: COCOMO® II 2000
Process Model: COCOMO® II Model
Estimate ID:
Model ID: 2000
Phases: Waterfall

Month	Effort this Month (Person-Months) RQ	PD	DD	CT	IT	Total	Cumulative Effort	Cost (K$) This Month	Cumulative Cost (K$)
1	0.4	0.3	0.0	0.0	0.0	0.7	0.7	7.8	7.8
2	0.0	0.8	0.3	0.0	0.0	1.1	1.8	15.0	22.8
3	0.0	0.0	1.3	0.3	0.0	1.7	3.5	15.3	38.1
4	0.0	0.0	0.0	1.7	0.0	1.7	5.1	19.7	57.7
5	0.0	0.0	0.0	0.3	1.1	1.4	6.5	15.0	72.7
6	0.0	0.0	0.0	0.0	0.1	0.1	6.7	1.5	74.2

8. **Costs for Component**



4. Conclusion and Recommendations

4.1 CONCLUSIONS:

The previous estimates and current estimates do not match. The reasons are:

1. The COCOMO estimates are designed to display the project's real-time estimates.
2. Previous estimates did not account for anything that went wrong.
3. COCOMO offers a methodical approach to project cost and duration estimation.
4. COCOMO calculates efforts in person-months
5. The previous Microsoft Project Plan estimates were manually calculated.
6. This is a perk of utilizing COCOMO for costs and efforts.
7. COCOMO considers factors such as PCAP, ACAP, PLEX, and others that consider programmer capability, analyst capability, or product complexity. These elements influence software cost and duration estimates. We do not consider these factors when planning with Microsoft Project Plan.

4.2 RECOMMENDATIONS:

1. I would recommend splitting the project into two parts.
2. According to the COCOMO estimates, the duration of our project will be around 5.5 months, rather than the 3 months we had previously planned.
3. In the first phase, provide the most important features such as 'Organization Registration,' 'Login & Payments Setup,' 'Profile Creation & Trading Goods, Tutoring.'
4. In the second phase, we can deliver features like ‘Searching, ‘Advertisements,’ & ‘Communication.’
5. By doing this, we can assure that our product is released at specific times and that the minimal viable product is delivered first, with more features coming later.

Appendices

- Agile Model:

  https://www.javatpoint.com/software-engineering-agile-model

- Cost estimation:

  http://www.softstarsystems.com/schedule.htm

  http://www.softstarsystems.com/faq.htm

  http://www.softstarsystems.com

  https://www.projectmanager.com/blog/cost-estimation-for-projects

- COCOMO Estimation for Agile Methodology:

  https://www.researchgate.net/publication/253235763_Estimating_Effort_in_Agile_Software_Development_Using_FPA_and_COCOMO_II

- Effort Estimation Calculations:

  https://www.project-management-knowhow.com/effort_estimation.html