

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



Project Management System

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What Is Project Management System?

Project Management System is a software program that is designed to solve the UN sustainability goal 9(Industry, Innovation and Infrastructure) using Graphs ADT in java.

It can be used in large projects to layout what components rely on other components, what tasks rely on other tasks and to minimize the total time or cost to completion while abiding by the dependences.



Identified Problems

1. Project delays:
 - This occurs when projects managers don't know which project components to purchase first and which tasks to prioritise.
2. Cost overrun:
 - Unexpected costs incurred in excess of budgeted amounts due to an underestimation of the actual tasks and components cost during budgeting.
3. Available funds:
 - Projects funding received on periodic basis which makes it difficult to go according to project plan and prolongs the project completion time.

NB: These problems lead to poor Industry, Innovation and infrastructure development.



Solutions for the problems

1. Project delays:

- The program creates a clear components and tasks layout and their dependencies and it also provides tasks critical path calculation functionality.

2. Cost overrun:

- The program provides tasks costs and duration calculation functionalities which will allow project managers to see how much they have to spend for each task and this functionality minimizes project cost.

3. Available funds:

- Given the available funds and preferred starting task, the program provides tasks prioritisation functionality. This functionality makes sure that project progress is not interrupted by available cash.



Methodology used

1. Graph vertices are used to store tasks and components information.
2. Graph edges are used to store dependencies between components and tasks as well.
3. Graph Depth-First Search(DFS) and Breath-First search(BFS) functionalities are used to determine all possible path between tasks and components as well.
4. Dijkstra's algorithm is used to determine the best tasks critical path cost and duration given available cash and preferred start task.



Requirements

1. The program should be robust.
2. The program should clearly draw the components and tasks graphs.
3. The program should calculate critical path between any two tasks.
4. The program should optimize projects given correct information.
5. The program should be able to create new and open existing projects.
6. The program should output status messages if any error occurs or if changes are made.



The Process Is Easy

Add
components

Add Tasks

Manage
Cost

Manage
Time

Optimize
Project



How The System Works

~ New Project creation

Project Management System - Project_Test

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Input

Please input project name:
Project_Test_1

OK Cancel

Required Component	Component	Required Component Quantity
1. Comp 1	Comp 7	1
2. Comp 4	Comp 7	1
3. Comp 6	Comp 2	1
4. Comp 3	Comp 6	1
5. Comp 6	Comp 3	1

Dependencies

Components And Dependencies Management

Dependency Addition (NB: Option 1 = Component & Option 2 = Required Component)

Comp 1

Comp 2

Add Dependency Required Quantity

Component Addition

Component Name Add Component

Dependency Deletion

<Comp 1> & <Comp 7>

Delete Dependency

Component Deletion

Comp 1

Delete Component

Click Project – New Project - to create a new project.

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Dependencies

Components And Dependencies Management

Dependency Addition (NB: Option 1 = Component & Option 2 = Required Component)

Comp 1

Comp 2

Add Dependency Required Quantity

Component Addition

Component Name Add Component

Dependency Deletion

Component Deletion

Component Name Add Component

Delete Dependency

Delete Component

New Empty Project.



How The System Works - Continued

- Project Components Addition

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Component 1 Component 2 Component 3

Component 4 Component 5 Component 6 Component 7

Dependencies

Components And Dependencies Management

Dependency Addition (NB: Option 1 = Component & Option 2 = Required Component)

Component 1

Add Dependency Required Quantity

Component Addition

Component Name

Add Component

Dependency Deletion

Delete Dependency

Component Deletion

Delete Component

Required Component Component Required Component Quantity

Fill in 'Component Name' textbox and click 'add component' button to Add new components.

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Component 1 Component 2 Component 3

Component 4 Component 5 Component 6 Component 7

Dependencies

Components And Dependencies Management

Dependency Addition (NB: Option 1 = Component & Option 2 = Required Component)

Component 1

Add Dependency Required Quantity

Component Addition

Component Name

Add Component

Dependency Deletion

Delete Dependency

Component Deletion

Delete Component

Required Component Component Required Component Quantity

Click refresh to load all tasks to workspace.



How The System Works ~ Continued

- Project Components Dependencies Addition

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Dependencies

Components And Dependencies Management

Dependency Addition (NB: Option 1 = Component & Option 2 = Required Component)

Component 5

Component 3

Add Dependency | 1

Component Addition

Component Name

Add Component

Dependency Deletion

Component 1

Delete Dependency

Component Deletion

Component 1

Delete Component

Required Component	Component	Required Component Quantity
1. Component 1	Component 2	1
2. Component 2	Component 3	1
3. Component 3	Component 7	1
4. Component 7	Component 6	1
5. Component 6	Component 2	1

Select Two components and Click 'Add Dependency' button to create a new dependency between components

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Dependencies

Components And Dependencies Management

Dependency Addition (NB: Option 1 = Component & Option 2 = Required Component)

Component 1

Component 1

Add Dependency | Required Quantity

Component Addition

Component Name

Add Component

Dependency Deletion

<-Component 1> & <-Component 2>

Delete Dependency

Component Deletion

Component 1

Delete Component

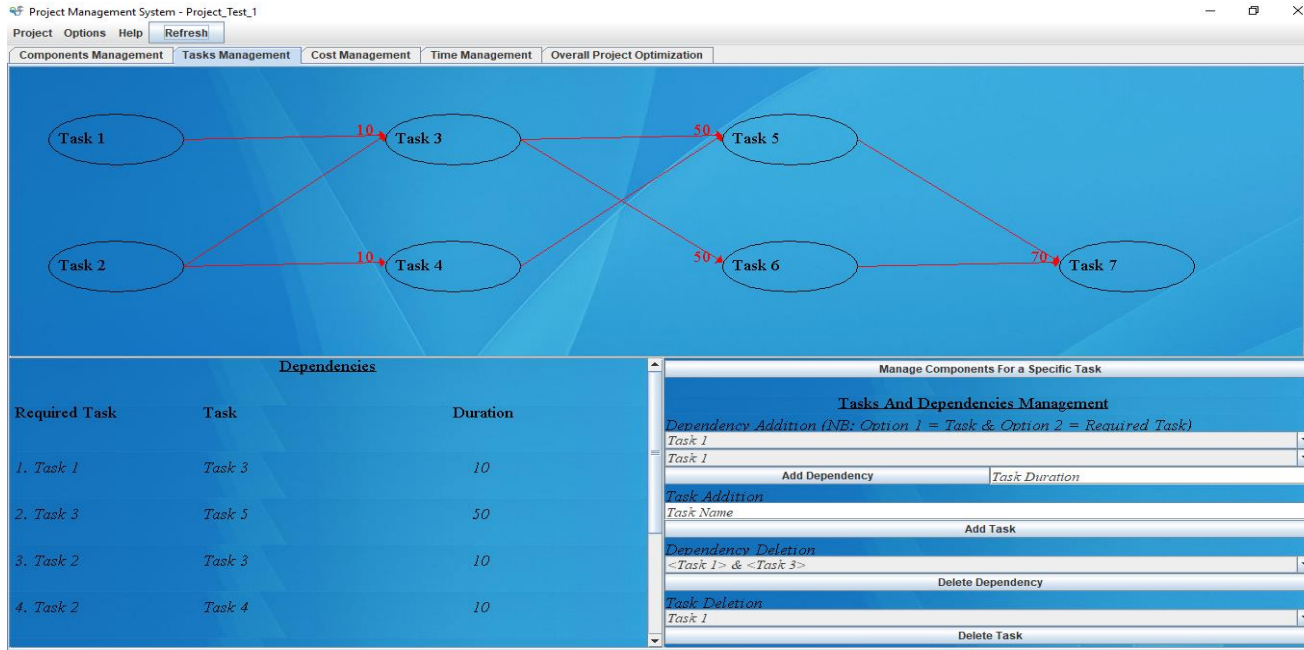
Required Component	Component	Required Component Quantity
1. Component 1	Component 2	1
2. Component 2	Component 3	1
3. Component 3	Component 7	1
4. Component 7	Component 6	1
5. Component 6	Component 2	1

Click refresh button to load dependencies to workspace



How The System Works - Continued

- Project Tasks and Dependencies Addition



The process is the same as for adding components and dependencies.



How The System Works - Continued

- Tasks components settings

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Task 1 Task 3 Task 5 Task 2 Task 4 Task 7

Manage Components For a Specific Task

Components Required by 'Task 1'

Required Task	Task	Duration
1. Task 1	Task 3	10
2. Task 3	Task 5	50
3. Task 2	Task 3	10
4. Task 2	Task 4	10

Change Task

Add Component

Delete Component

Task Duration

Add Task

Delete Dependency

Delete Task

Click 'Manage Components for a specific Task' to set components required by a specific task and below that select component and click 'Add Component'.

Project Management System - Project_Test_1

Project Options Help Refresh

Components Management Tasks Management Cost Management Time Management Overall Project Optimization

Task 1 Task 3 Task 5 Task 2 Task 4 Task 7

Manage Components For a Specific Task

Components Required by 'Task 3'

Required Task	Task	Duration
1. Task 1	Task 3	10
2. Task 3	Task 5	50
3. Task 2	Task 3	10
4. Task 2	Task 4	10

Change Task

Add Component

Delete Component

Task Duration

Add Task

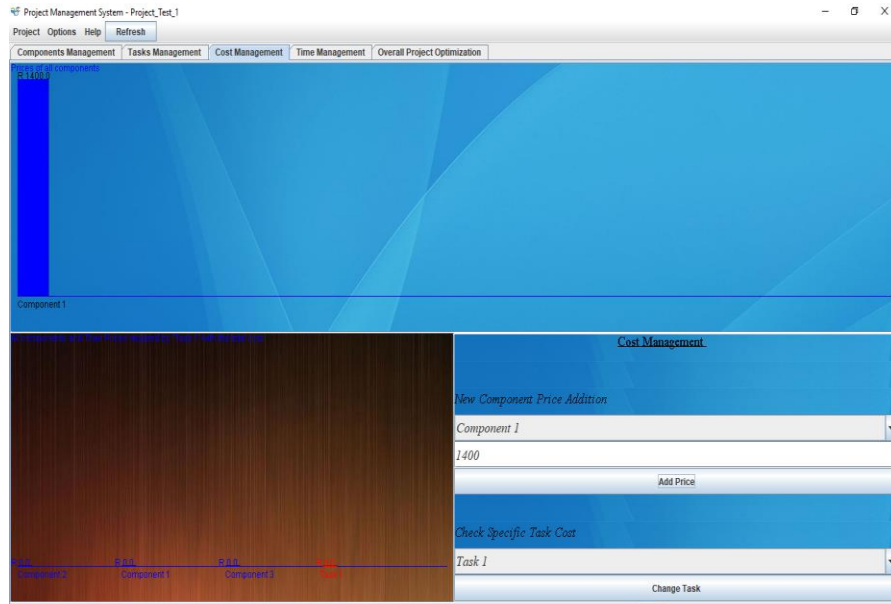
Delete Dependency

Delete Task

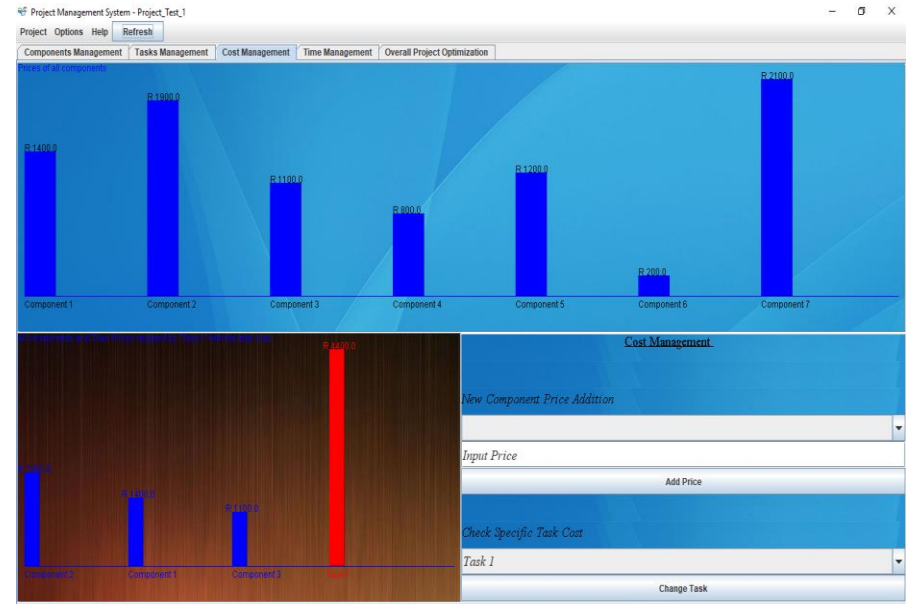
Select Task and Click 'Change task' to move to the next task.



How The System Works - Continued - Cost Management



Select Component, type In the price(a number) and click 'Add price' to add a price for a specific component.

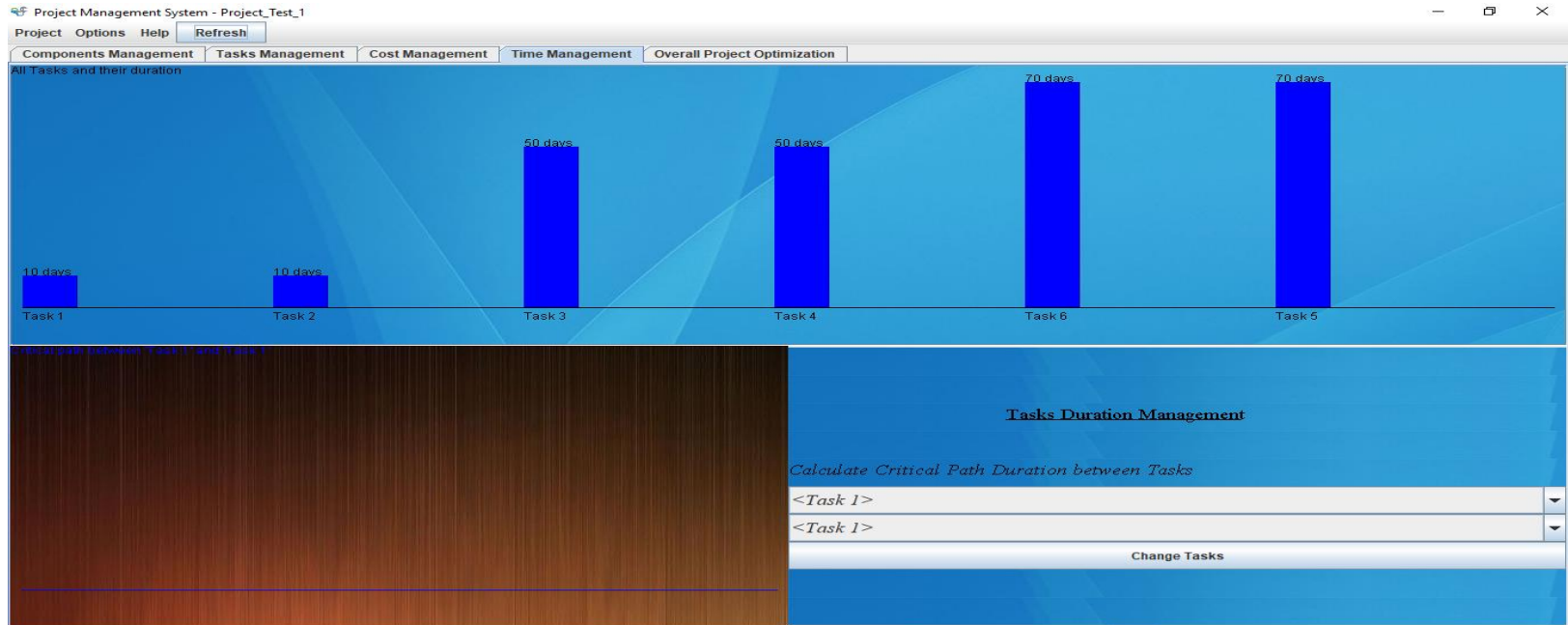


Click refresh button after adding a new price and select task and click 'Change Task' to view cost of the selected task.



How The System Works - Continued

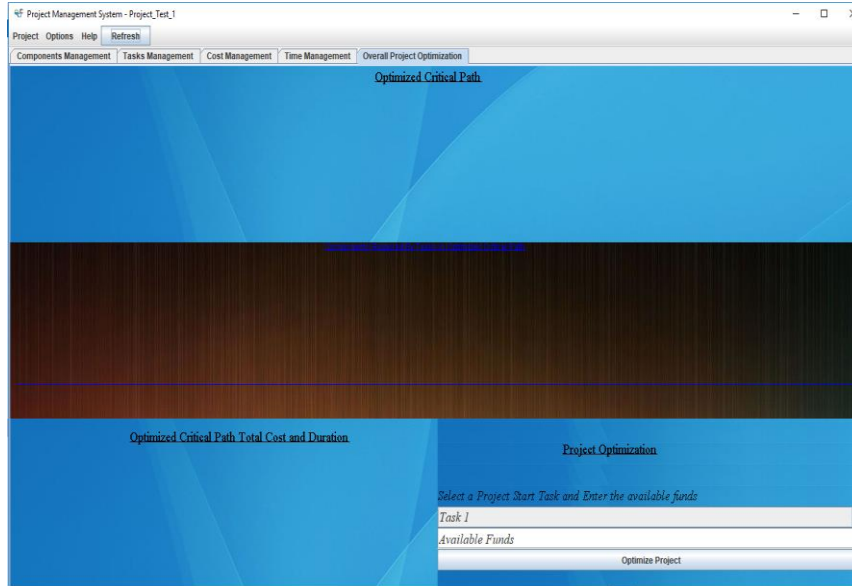
~ Time Management



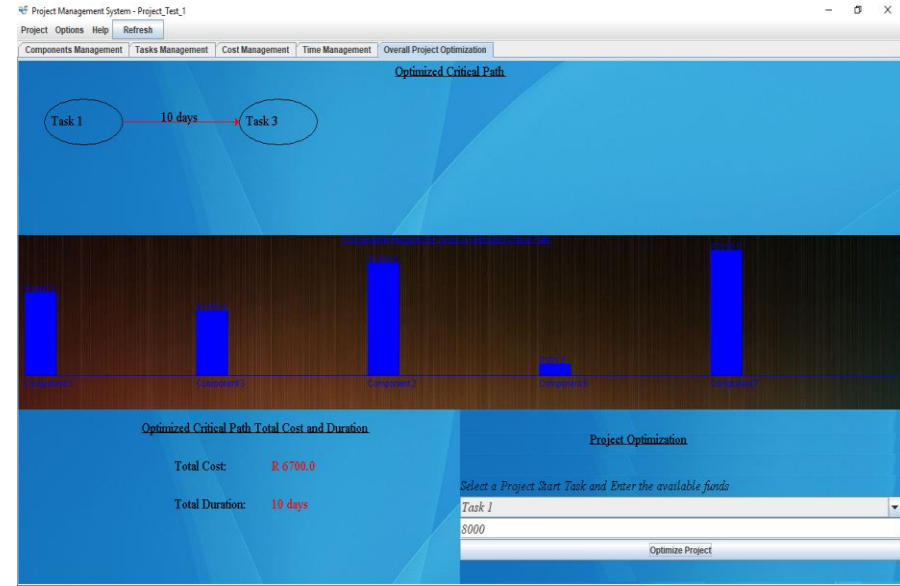
Select Tasks and click 'Change Tasks' to determine the critical path between the two Tasks.



How The System Works - Continued - Overall Project Optimization



Unoptimized project.

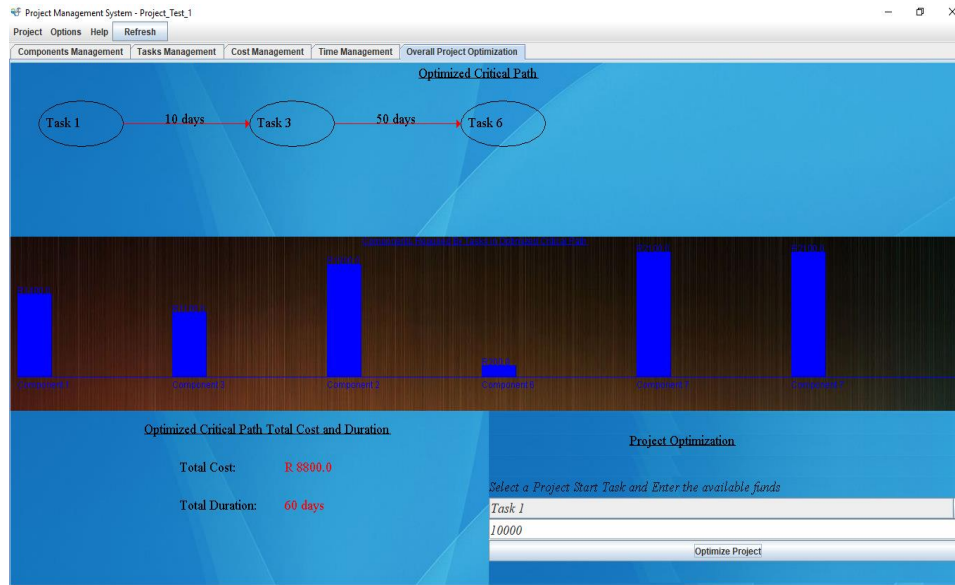


Select a preferred project starting task, type in the project available funds and click 'Optimize Project'

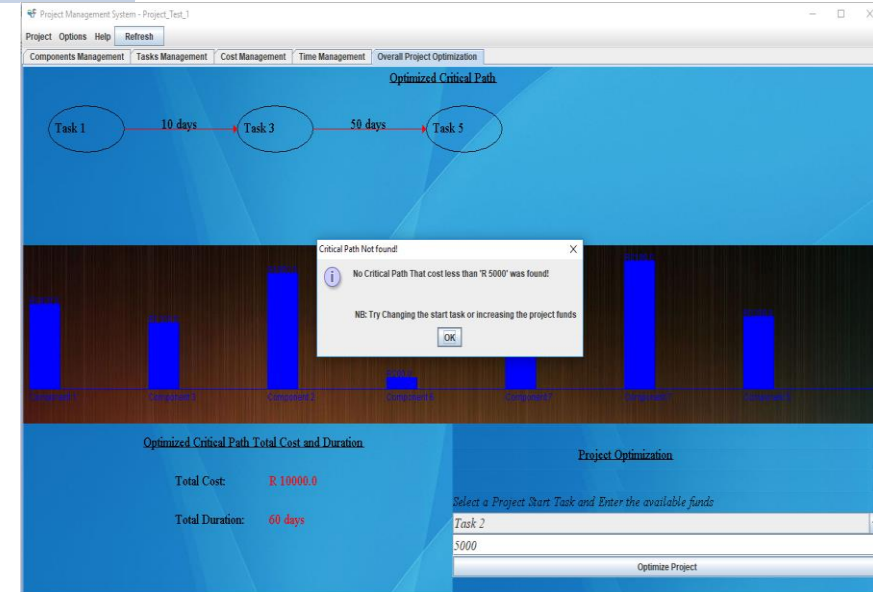


How The System Works - Continued

- Overall Project Optimization - continued



Keep on changing starting tasks and available funds to obtain best results.

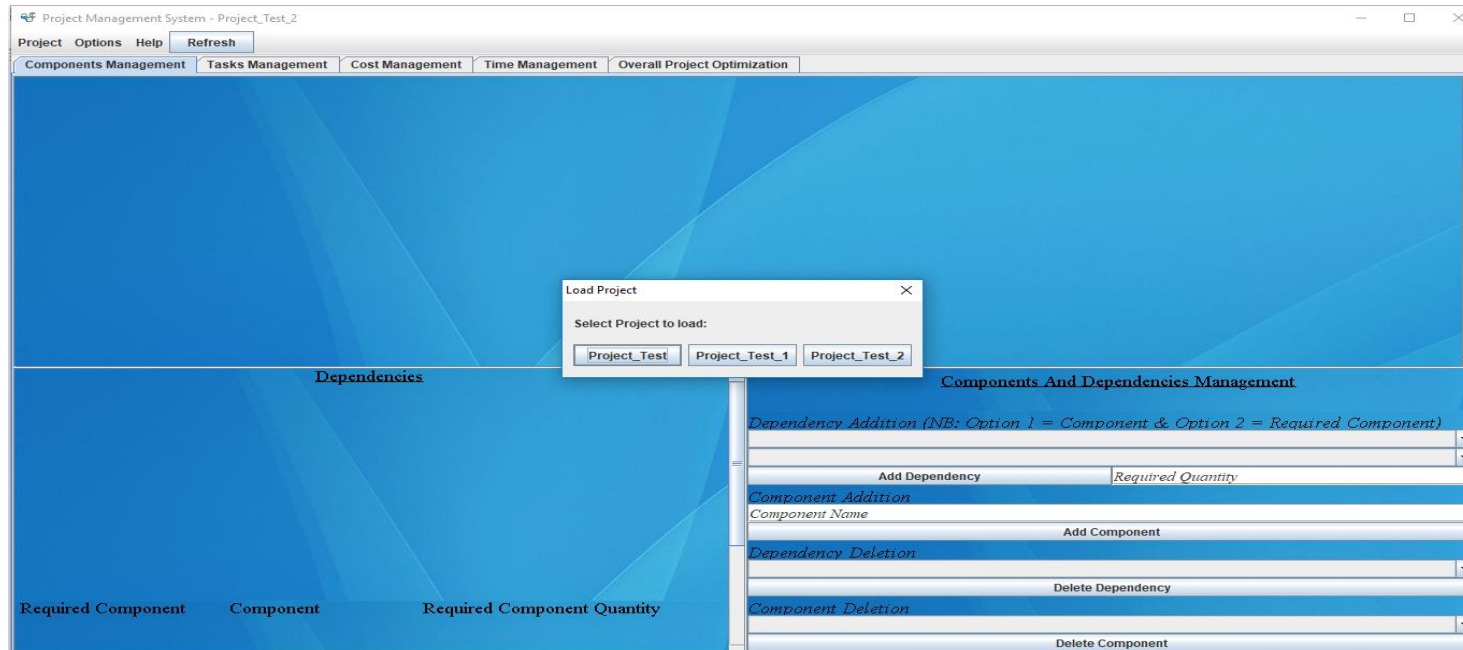


Keep on changing starting tasks and available funds to obtain best results.



How The System Works - Continued

- Loading existing projects



Click Project – Open existing project from file system: - to load previously saved projects



THANKS!