**Assignment Type:**Individual Project   **Deliverable Length:**4 body pages, 1 PERT chart, 1 Gantt chart

Using your current work organization (or an organization of interest) as the subject matter, research the elements of business and prepare an APA formatted paper that:

* Analyzes the organization’s basic legal, social, and economic environments
* Analyzes the organization’s managerial, operational, and financial issues including:
	+ Project Management
	+ Project Timelines
	+ Critical Paths and Contingency Planning
	+ Implementation Plan Contingencies
	+ Staffing Needs and Tools
	+ One Gantt Chart Example
	+ One PERT Chart Example
* Analyzes the impact of potential change factors and the impact on the functions of management

*This assignment will be assessed using additional criteria provided*[*here*](http://coursebuildercontent.careeredonline.com/Content.aspx?sun=29990).

**Please submit your assignment.**

**Submitting your assignment in APA format means, at a minimum, you will need the following:**

1. **TITLE PAGE.** Remember the Running head: AND TITLE IN ALL CAPITALS
2. **ABSTRACT.** A summary of your paper…not an introduction. Begin writing in third person voice.
3. **BODY.** The body of your paper begins on the page following the title page and abstract page and must be double-spaced (be careful not to triple- or quadruple-space between paragraphs). The type face should be 12-pt. Times Roman or 12-pt. Courier in regular black type. Do not use color, bold type, or italics except as required for APA level headings and references. The deliverable length of the body of your paper for this assignment is 4-5 pages. In-body academic citations to support your decisions and analysis are required. A variety of academic sources is encouraged.
4. **REFERENCE PAGE.** References that align with your in-body academic sources are listed on the final page of your paper. The references must be in APA format using appropriate spacing, hang indention, italics, and upper and lower case usage as appropriate for the type of resource used. Remember, the Reference Page is not a bibliography but a further listing of the abbreviated in-body citations used in the paper. Every referenced item must have a corresponding in-body citation.

Click on [**Critical Path**](http://www.mindtools.com/critpath.html) for more help on PERT charts.

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Critical Path Analysis and PERT Charts

Planning & scheduling more complex projects
*Related variants: AOA or Activity-on-Arc Diagrams*







Multiple activities often feed into other activities.

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Critical Path Analysis and PERT are powerful tools that help you to schedule and manage complex projects. They were developed in the 1950s to control large defense projects, and have been used routinely since then.

As with [**Gantt Charts**](http://www.mindtools.com/pages/article/newPPM_03.htm), Critical Path Analysis (CPA) or the Critical Path Method (CPM) helps you to plan all tasks that must be completed as part of a project. They act as the basis both for preparation of a schedule, and of resource planning. During management of a project, they allow you to monitor achievement of project goals. They help you to see where remedial action needs to be taken to get a project back on course.

Within a project it is likely that you will display your final project plan as a Gantt Chart (using Microsoft Project or other software for projects of medium complexity or an excel spreadsheet for projects of low complexity).The benefit of using CPA within the planning process is to help you develop and test your plan to ensure that it is robust. Critical Path Analysis formally identifies tasks which must be completed on time for the whole project to be completed on time. It also identifies which tasks can be delayed if resource needs to be reallocated to catch up on missed or overrunning tasks. The disadvantage of CPA, if you use it as the technique by which your project plans are communicated and managed against, is that the relation of tasks to time is not as immediately obvious as with Gantt Charts. This can make them more difficult to understand.

## How to Use the Tool:

As with Gantt Charts, the essential concept behind Critical Path Analysis is that you cannot start some activities until others are finished. These activities need to be completed in a sequence, with each stage being more-or-less completed before the next stage can begin. These are 'sequential' activities.

Other activities are not dependent on completion of any other tasks. You can do these at any time before or after a particular stage is reached. These are non-dependent or 'parallel' tasks.

## Drawing a Critical Path Analysis Chart

Use the following steps to draw a CPA Chart:

### Step 1. List all activities in the plan

For each activity, show the earliest start date, estimated length of time it will take, and whether it is parallel or sequential. If tasks are sequential, show which stage they depend on.

For the project example used here, you will end up with the same task list as explained in the article on Gantt Charts (we will use the same example as with Gantt Charts to compare the two techniques). The chart is repeated in Figure 1 below:

**Figure 1. Task List: Planning a custom-written computer project**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Task** | **Earliest start** | **Length** | **Type** | **Dependent on...** |
| A. High level analysis | Week 0 | 1 week | Sequential |  |
| B. Selection of hardware platform | Week 1 | 1 day | Sequential | A |
| C. Installation and commissioning of hardware | Week 1.2 | 2 weeks | Parallel | B |
| D. Detailed analysis of core modules | Week 1 | 2 weeks | Sequential | A |
| E. Detailed analysis of supporting modules | Week 3 | 2 weeks | Sequential | D |
| F. Programming of core modules | Week 3 | 2 weeks | Sequential | D |
| G. Programming of supporting modules | Week 5 | 3 weeks | Sequential | E |
| H. Quality assurance of core modules | Week 5 | 1 week | Sequential | F |
| I. Quality assurance of supporting modules | Week 8 | 1 week | Sequential | G |
| J.Core module training | Week 6 | 1 day | Parallel | C,H |
| K. Development and QA of accounting reporting | Week 5 | 1 week | Parallel | E |
| L. Development and QA of management reporting | Week 5 | 1 week | Parallel | E |
| M. Development of Management Information System | Week 6 | 1 week | Sequential | L |
| N. Detailed training | Week 9 | 1 week | Sequential | I, J, K, M |

### Step 2. Plot the activities as a circle and arrow diagram

Critical Path Analyses are presented using circle and arrow diagrams.

In these, circles show events within the project, such as the start and finish of tasks. The number shown in the left hand half of the circle allows you to identify each one easily. Circles are sometimes known as nodes.

An arrow running between two event circles shows the activity needed to complete that task. A description of the task is written underneath the arrow. The length of the task is shown above it. By convention, all arrows run left to right. Arrows are also sometimes called arcs.

An example of a very simple diagram is shown below:



This shows the start event (circle 1), and the completion of the 'High Level Analysis' task (circle 2). The arrow between them shows the activity of carrying out the High Level Analysis. This activity should take 1 week.

Where one activity cannot start until another has been completed, we start the arrow for the dependent activity at the completion event circle of the previous activity. An example of this is shown below:



Here the activities of 'Select Hardware' and 'Core Module Analysis' cannot be started until 'High Level Analysis' has been completed. This diagram also brings out a number of other important points:

* Within Critical Path Analysis, we refer to activities by the numbers in the circles at each end. For example, the task 'Core Module Analysis' would be called activity 2 to 3. 'Select Hardware' would be activity 2 to 9.
* Activities are not drawn to scale. In the diagram above, activities are 1 week long, 2 weeks long, and 1 day long. Arrows in this case are all the same length.
* In the example above, you can see a second number in the top, right hand quadrant of each circle. This shows the **earliest start time**for the following activity. It is conventional to start at 0. Here units are whole weeks.

A different case is shown below:



Here activity 6 to 7 cannot start until the other four activities (11 to 6, 5 to 6, 4 to 6, and 8 to 6) have been completed.

Click the link below for the full circle and arrow diagram for the computer project we are using as an example.

[**Figure 5: Full Critical Path Diagram**](http://www.mindtools.com/pages/article/newPPM_99.htm)

This shows all the activities that will take place as part of the project. Notice that each event circle also has a figure in the bottom, right hand quadrant. This shows the latest finish time that's permissible for the preceeding activity if the project is to be completed in the minimum time possible. You can calculate this by starting at the last event and working backwards.The latest finish time of the preceeding event and the earliest start time of the following even will be the same for ciircles on the critical path.

You can see that event M can start any time between weeks 6 and 8. The timing of this event is not critical. Events 1 to 2, 2 to 3, 3 to 4, 4 to 5, 5 to 6 and 6 to 7 must be started and completed on time if the project is to be completed in 10 weeks. This is the 'critical path' – these activities must be very closely managed to ensure that activities are completed on time. If jobs on the critical path slip, immediate action should be taken to get the project back on schedule. Otherwise completion of the whole project will slip.

## 'Crash Action'

You may find that you need to complete a project earlier than your Critical Path Analysis says is possible. In this case you need to re-plan your project.

You have a number of options and would need to assess the impact of each on the project’s cost, quality and time required to complete it. For example, you could increase resource available for each project activity to bring down time spent on each but the impact of some of this would be insignificant and a more efficient way of doing this would be to look only at activities on the critical path.

As an example, it may be necessary to complete the computer project in Figure 5 in 8 weeks rather than 10 weeks. In this case you could look at using two analysts in activities 2 to 3 and 3 to 4. This would shorten the project by two weeks, but may raise the project cost – doubling resources at any stage may only improve productivity by, say, 50% as additional time may need to be spent getting the team members up to speed on what is required, coordinating tasks split between them, integrating their contributions etc.

In some situations, shortening the original critical path of a project can lead to a different series of activities becoming the critical path. For example, if activity 4 to 5 were reduced to 1 week, activities 4 to 8 and 8 to 6 would come onto the critical path.

As with Gantt Charts, in practice project managers use software tools like [**Microsoft Project**](http://www.amazon.com/exec/obidos/ASIN/B000059L47/qid%3D1012562020/sr%3D8-4/mindtools) to create CPA Charts. Not only do these make them easier to draw, they also make modification of plans easier and provide facilities for monitoring progress against plans.

## PERT (Program Evaluation and Review Technique)

PERT is a variation on Critical Path Analysis that takes a slightly more skeptical view of time estimates made for each project stage. To use it, estimate the shortest possible time each activity will take, the most likely length of time, and the longest time that might be taken if the activity takes longer than expected.

Use the formula below to calculate the time to use for each project stage:

shortest time + 4 x likely time + longest time
-----------------------------------------------------------
6

This helps to bias time estimates away from the unrealistically short time-scales normally assumed.



## Key Points:

Critical Path Analysis is an effective and powerful method of assessing:

* What tasks must be carried out.
* Where parallel activity can be performed.
* The shortest time in which you can complete a project.
* Resources needed to execute a project.
* The sequence of activities, scheduling and timings involved.
* Task priorities.
* The most efficient way of shortening time on urgent projects.

An effective Critical Path Analysis can make the difference between success and failure on complex projects. It can be very useful for assessing the importance of problems faced during the implementation of the plan.

PERT is a variant of Critical Path Analysis that takes a more skeptical view of the time needed to complete each project stage.



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