Design Project Initial Scenario and General Project Roadmap

This document describes both the initial scenario for your team Design Project, and gives a general roadmap describing what will be your progression toward the culminating work product.

Project Deliverables

This project has six deliverables, four team {group}, and two individual {individual}:

Four of these deliverables will be the collective responsibility of your Project Design team, with *all* team members contributing to it.

The team deliverables are:

Project Team Design Review 1

Project Team Design Review 2

Design Project Final Submission

Each of these three team deliverables shall be the product of *all* team members participating, with one team member, chosen by the team, submitting the work product to Blackboard

The Design Reviews are, for the most part, simple submissions of work in progress, reflective of concepts covered in the class up to the time of the submission.

At the end of the semester, during the last week of class, your Design Project team shall present to the class its network design, giving rationale behind your decisions, and answering questions about your design. You will find this exercise on the Weekly Agenda as

Group Design Project Presentations

Some teams shall present on Monday of that week, with the other teams presenting on Wednesday of that week. Sometime around mid-semester, your team will be assigned one of the two days via lottery, to be conducted in class.

The individual deliverables are:

Project Team Member Memo 1

Project Team Member Memo 2

These individual deliverables are brief memos, and for the most part simple status updates and personal observations.

Initial Scenario

Be advised that the scenario will evolve as the semester progresses.

For the most part, these evolutions will consist of added network devices and functionality such as switches, routers, and firewalls, additional users and user needs, and additional office spaces.

The goal of this project is to put key network concepts into action. You will accomplish this by designing a small data network for a Non-Profit Organization (NPO) of your team's choosing.

The initial scenario is simple:

A small business has closed, and the owner of an office building has decided to allow your NPO to occupy the space vacated by that small company at a dramatically reduced rent.

The network cabling installed by the former occupant was discovered to be not to code, and was removed completely by the building owner's maintenance staff.

The data network hardware - a pair of 12-port Ethernet hubs - was not attached to proper surge protection, and was damaged during a recent storm.

The building manager informs you that the former occupant's Internet Service Provider (ISP) removed all Customer Premises Equipment (CPE) owned by the ISP a few weeks ago,

The tenant occupying that space, as part of their liquidation arrangement with the building owner, has left the following equipment behind:

> Eighteen (18) desktop computers, half with CRT screens, half with 17" LCD monitors, with hardware ranging from Pentium III to Celerons, and with anywhere from 256 MB of RAM, to 2 GB of RAM. The operating systems on these computers range from Microsoft Windows 2000 to Windows 7.

> The building owner informs you that it is unknown what programs files remain on these computers, and that the previous occupant had been given more than adequate time to have removed and/or copied anything they needed from these machines. A written manifest lists that a number of versions of Microsoft Office Suite, and Corel WordPerfect may be installed on some of these desktop computers.

At present, your NPO consists of a full-time director, a full-time staff of four, five part-time staff, and thirty-five graduate student interns and volunteers.

Your team is to prepare a proposal that contains the following:

A workable design for a Local Area Network (LAN) that allows the above personnel, and anyone else your team deems necessary, networked computer access.

Services for this network shall include: file and print-sharing services, database-sharing services, and Internet access

This network shall be secure to the requirements of the type of NPO that your team has selected.

This proposal shall also contain budget, materials make and model of each device to be procured, and any software, including operating systems, that is to be procured.

Cost performance shall be a primary factor, but not to the exclusion of productivity.

Of key importance is a description of how workflow will be enhanced by the inclusion of networked services. The very best proposals will consider opportunities for re-engineering workflows to take advantage of new network technologies.

Your proposal shall also include who will provide what services in the installation and maintenance of this network, and a consideration of recurring costs.

You will be provided with a general floorplan of the facility. Your final and transitional work products may use this floorplan as a basis for diagramming

General physical layout of your network

Details of any server room(s), telecommunication equipment room(s) or closet(s)

Anything else that your team deems germane to the project

Progression toward the Culminating Work Product for this Project

So that you and your team will have a general idea of what will be expected of you for this project, below, under *General Requirements for the Culminating Work Product for this Project*, you will find a summary of the requirements of the paper - *Design Project Final Submission* - that will be due at the end of the semester.

Everything that you do, both as a design project team and as a design project team member, in the assignments listed below is intended to move you closer to completion of the *Design Project Final Submission*. These assignments are, again:

> *Project Team Design Review 1*
> *Project Team Design Review 2*
>
> *Project Team Member Memo 1*
> *Project Team Member Memo 2*

After completion of *Project Team Design Review 1*, in preparation for *Project Team Design Review 2*, you will be presented with a few additional business requirements, e.g. additional office space on an upper floor and more users.

After completion of *Project Team Design Review 2*, in preparation for *Design Project Final Submission*, you will be presented with yet more additional business requirements, e.g. a small remote office that needs to connect to the main office.

Additionally, you will find that this entire course is highly integrated: the readings give preparation for lectures, and the concepts and practices discussed in the textbook and lectures are instantiated, in part, in the lab exercises. As you become familiar with concepts, network devices, and practices, you will incorporate them into your progressing work on the Design Project.

Skim *General Requirements for the Culminating Work Product for this Project* below to gain a general idea of where these are going.

Do not be intimidated: all of these components will be presented to you in logical pieces and in a logical progression.

General Requirements for the Culminating Work Product for this Project

I.   Cover Page

Title of assignment, class title and number, date assignment completed, and the names of all team members.

II.   Executive Summary

This is a very brief capsule summary of the specifics of your design proposal, written for a non-technical executive audience. It should directly and concisely outline the purpose the included documents, and should not exceed a few paragraphs.

III.   Written Description

This is a written description of the network in general, referencing as needed the diagrams in *Appendix A: Physical Network Diagram* and *Appendix B: Logical Network Diagram*. Of key importance is consideration to workflows, and how you intend to use technology to accommodate those workflows. In this section, you will explain your reasoning for the decisions you made.

Costs are detailed in *Appendix C: Bill of Materials*.

IV.   Network Policies

Briefly describe the network protocols used, any naming conventions such as DNS or Directory Services, and environmental and power issues. Give rationale as to why you chose to place respective network devices in the locations that you did.

Be sure to include, in summary, *who* will be managing this network, once it gets built.

V.   Security Policies

Describe your priorities for information security, and the measures you have put in place to address various issues of physical and logical security. Be clear and specific in your wording of these priorities and measures.

Include user access, network access, and password policies, encryption use, firewalls, IDS/IPS, logging and monitoring, virus protection, physical access rules, and assessing for vulnerabilities.

Describe briefly how your organization addresses security violations.

VI.   Disaster Recovery Policy

In essence, what will your organization do if the site it is using is destroyed, damaged, or becomes uninhabitable. How will it continue to perform its business functions and carry out its mission?

Include policies and procedures for backing up data, for addressing hardware (e.g. disk storage, server, or network infrastructure) failure, and power failure.

Consider the use of cold sites, warm sites, and/or hot sites.

VII.   Budget

The budget section is, mostly, a spreadsheet-version restatement items listed in *Appendix C: Bill of Materials*. The two key differences between this spreadsheet and the Bill of Materials (BOM) are:

1. The BOM enumerates what needs to be procured, while the Budget contains both what is needed, and what is already had, e.g. existing devices, infrastructure, and other assets and resources.

2. The budget also contains consideration for existing costs that are mitigated and/or avoided by the introduction of the technologies and practices described in your proposal, e.g. "We anticipate reducing travel expenses by $ xxx.xx per month by introducing basic videoconferencing technology in…"

A good budget presents not only costs, but also opportunities.

Appendix A: Physical Network Diagram

This is the physical layout of your network, including buildings, floorplans, LAN, MAN, and WAN links, and all other physical connectivity. Physical diagrams shall include network devices such as major computing devices (e.g. servers, summarized groups of enduser devices, and major output devices such as plotters), switches, routers, wireless infrastructure, firewalls, and other security apparatus.

In general, physical diagrams show which physical device is connected to which physical device and by which physical medium (e.g. cable or radio beam).

Your physical diagrams shall include general floorplans, with physical connectivity, and any LAN and/or WAN layouts. They shall also include details of any communication closets and/or server rooms. Include cable lengths, types, and standards. Label devices and connections as needed.

Include also endpoints: these include servers, workstations, printers, conferencing units and VoIP telephones and other network-connected devices. For these diagrams, use Microsoft Visio (available to all CCI students) to create them, and submit them in PDF format.

Appendix B: Logical Network Diagram

This is the logical layout of your network, including IP addresses for subnets and for major devices, and the logical connectivity and routing of devices. In all likelihood, your logical design will be hierarchical.

Logical diagrams show where these devices are programmed to send data (e.g. the network is programmed to send internal data around the internal network, and all else out the Internet-connected firewall).

Include in your logical diagram network protocols used (e.g. IP, DNS, HTTP/S, SMTP, SNMP).

For these diagrams, use Microsoft Visio (available to all CCI students) to create them, and submit them in PDF format.

Both physical and logical diagrams will be presented to you in class.

The difference between physical and logical diagrams could be reasonably compared to the difference between anatomy, which is the study of *what goes where* and how it is physically-connected, and physiology, which is the study of the *functions* these structures *perform*, and how.

Appendix C: Bill of Materials

This is a simple list of equipment, such as computers, switches, routers, firewalls, wireless apparatus, and other devices. This list shall also include any software you intend to procure, as well as the amounts of network cabling, and number of data jacks and patch panels.

Do not to estimate labor in person-hours per major task. You might also find it useful to label each group of labor as being performed by whom: paid and volunteer in-house staff, and external volunteers and paid contractors.

Give estimates of costs for these items, and totals.

In some proposals and with some audiences, presenters will choose to reveal the total project cost in the Executive Summary. In others, presenters find it best to withhold the total until it is adequately explained what the audience will get for their investment.