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A Network Implementation Class Exercise: BusinessQuest Business Incubator, LLC

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Teaching Case

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ABSTRACT

One way to bring concepts to life in an introductory data networks course is for students to physically build a network that addresses a real business problem. However it can be challenging to find a suitable business problem, particularly if the network can exist only during the class period. This case presents a realistic business scenario and network implementation exercise that can be completed in one or two class periods in any classroom with Internet access. The objective of the exercise is for students to solve a business problem by applying concepts related to basic network configuration, local area networks and IP addressing. This is accomplished by setting up a small local area network in a classroom using computers, cabling, routers, and switches. Students are also required to implement the software changes needed for the network to have access to the Internet. The business client is an entrepreneurial incubator company called *BusinessQuest.* Students must work with their own team members as well as other teams to meet the business needs, and must document adherence to established policies and standards.

Keywords: Data Networks, Business Case, Local Area Networks, Team

1. CASE SUMMARY

This paper describes a class exercise that requires student teams to implement a data network that addresses a realistic business problem. The business client is an entrepreneurial incubator company called *BusinessQuest, LLC.* In the exercise BusinessQuest has rented space in a nearby airport office park building and needs a local area network (LAN) set up to support five client businesses, called 'Startups'. Students are asked to set up the BusinessQuest LAN using instructor-provided computers, cabling, routers and switches. Students work in teams of three to five members. Each team is assigned one of the BusinessQuest Startups and installs the network for that client. Each team also works with other teams to ensure proper installation of the overall network for BusinessQuest. The students follow a series of quality control steps that require them to apply established policies and standards, document their planned actions and get approval before proceeding to the next step. The documentation and the physical network setup serve as deliverables for grading.

The exercise has been performed with classes of up to five teams and can be conducted in any classroom where there is network Internet access. The exercise can be completed in one 75 minute class or two, 50 minute classes. The typical audience for the exercise includes undergraduate business majors who have had little if any exposure to network concepts prior to the course. Students are usually MIS major or minors, and are familiar with basic programming concepts.

2. CASE TEXT

Congratulations! Your team has been awarded a contract to set up a network for BusinessQuest, LLC, an incubator company for small, start-up businesses. The purpose of the incubator is to provide office space, business expertise, and information technology to assist entrepreneurs in growing their businesses.

BusinessQuest itself has just started and is located in a small office in the Airport Office Park. The one room warehouse space leased by BusinessQuest is large enough to house 6 cubicle-style mini-offices: one for the BusinessQuest staff and 5 cubicles for the 5 start-up companies currently working with BusinessQuest. Each start-up business has been allocated two computers. Printers have been ordered, but have not arrived, and so printers *will not* be part of the network you set up. Each start-up business needs access to the Internet, but the startups do not need to communicate directly with each other. The start-ups function as separate business entities. One or two additional computers may be issued to a start-up in the future if their growth makes it necessary. Your team has been assigned to one of the start-ups at the Airport Office Park. You must

work with each of the other teams, who represent the other start-ups, to install the network.

There is one port in the BusinessQuest office, which acts as a gateway to the backbone that provides the Internet connection. The port also provides access to a DNS server. The backbone and DNS server are maintained by the office park IT personnel. Initial traffic to and from the start-ups is expected initially to be low, but hopefully will grow quickly to a moderate (not high) level. BusinessQuest's budget is limited, but they are committed to providing good network performance for the start-ups.

BusinessQuest has hired a full-time IT director, Elizabeth Smith, who goes by the nickname of Bitsy. Bitsy has established policies and standards for BusinessQuest contractors that must be followed. Included with this assignment is an email Bitsy sent out to all of the IT contractors regarding the policies and standards. Bitsy has ordered the network equipment, which will be available to you when you start the work.

This is Bitsy's first month as IT director and she believes in a hands-on approach to management. Also, in the past there have been problems with contractors who did not have the requisite knowledge to complete their contracts. Therefore Bitsy has implemented a step-by-step quality control process for the Airport Office Park network installation. The process and associated deliverables are explained in an email from Bitsy, which is shown in Document 1. The email also includes an attachment with policies and standards, which is shown in Document 2. Your team will be evaluated based on Bitsy's quality control steps and deliverables. The evaluation sheet is shown in Document 3. Points will be deducted from each deliverable if a contractor needs outside assistance. Each member of a team will receive the same 'pay' (points).

Document 1 - Bitsy's Email
To: All Airport Office Park IT Contractors
From: Elizabeth Smith, IT Director, BusinessQuest, LLC
RE: Network Installation

Dear Contractors,

Congratulations on your winning bid for the Airport Office Park network installation. The equipment for the project has been ordered and will be at the office when you arrive on Thursday, October 25.

Due to the large number of IT contractors working for BusinessQuest, I have implemented several policies regarding network implementations. The policies are in the attached documents. Work that does not adhere to the policies will be deemed unacceptable and payment for such work will be withheld. For the Airport Park installation I have also instituted several quality control steps and deliverables, which are outlined in the attached document.

I hope to have a chance to stop by occasionally during the project to meet you all. Again, congratulations.

Bitsy

Document 2 - BusinessQuest, LLC
IT Network Policies and Standards

As of October 15 The following policies and standards will be followed by all IT contractors employed by BusinessQuest.

General Policies for all Sites
Policy #1: Unless approved by the IT Director, the use of wireless networks is prohibited. All networks will be hard wired.
Policy #2: Unless approved by the IT Director, the use of dynamic host control protocol is prohibited. Only static IP addresses will be used.

Quality Control Steps and Deliverables for Airport Office Park Network install
In order to ensure high quality the following deliverables are expected as work progresses:

Deliverable #1:
a. Before starting work, provide a quick sketch of the network (how it will look in this room), given the equipment provided.
b. What other information, policies or standards would do you need from me, Bitsy, in order to set up the network?
c. This work will be completed and approved before work progresses further.

Deliverable #2: Complete the physical cabling of the network

Deliverable #3: Provide a written plan describing how the policies and addressing standards described above will be followed. Each step of the plan must be approved by Bitsy before changes are made to any equipment.
a. **Step 1:** On the form provided (Contractor Form #1, Document 4), indicate how you will implement Policies #1 and #2 above. Obtain Bitsy's approval before actually making this change.
b. **Step 2:** On the form provided (Contractor Form #2, not shown), indicate what additional changes if any will be made to the router and computer configurations. in order to implement the network.

Deliverable #4: Provide proof that the start-up businesses can access the Internet through each computer. Proof should also be provided that all start-ups within BusinessQuest can access the Internet at the same time. What changes, if any, need to be made to the Linksys router configuration in order to comply with policies #1 and #2?

3. CONCLUSION

This class exercise requires students to apply basic concepts about local area networks and IP addressing to a realistic business problem. Student must also use collaboration skills and follow established business policies to successfully complete the work. Students often teach other students during the exercise. The level of difficulty of the exercise is intended for introductory data networks students, but the

Deliverable/Step #	Deliverable and Evaluation Criteria	Points
1	**Quick network sketch and Additional Information question:** • Sketch accuracy • Sketch completeness • Sketch is readable and understandable • Sketch is delivered in a timely fashion • Additional information requested is appropriate • Additional information request completeness	
2	**Cabling:** • Team assigned cabling is correct • Team assigned cabling is completed in a timely fashion • Team members work well with other teams to complete common cabling	
3 Step 1	**General Policies Implemented** • Written proof that general policies were followed is provided • Written proof is complete, contains all necessary items • Written proof is readable, understandable and completed in a timely fashion	

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Step 2
	IP addressing and network setup
	• Team is aware of router settings that needed changing
	• Team is aware of client settings that needed changing
	• Planned changes to router configuration are correct
	• Planned changes to client configuration are correct
	    (points may be deducted if corrections need to be made to plan)
	• Plan is readable, understandable and delivered in a timely fashion
	• Teams successfully completes required router changes
	• Teams successfully completed required client changes
	    (points may be deducted if team requires assistance)	

4	**Proof of Internet Accessibility**	
-	**Contractor Team Work Ethics** • Contractor team members worked well together • Contractor team arrived as scheduled, on time • Contractor team showed enthusiasm and interest in the job	
	Total Points	

Document 3. Assignment Evaluation Criteria

Document 4
Contractor Form #1
(Part of Deliverable #3, to be handed out after the completion of Deliverable #2)

Contractor Form #1
Contractor Names: _____

level can be easily modified by providing more or less information to the students.

Many students who have completed the exercise report a sense of accomplishment and feel assured that they have the knowledge and capability to physically implement a data network. The hands-on work of unpacking routers from boxes and placing equipment in the classroom, as well as physically running and plugging in cables, provides a sense of satisfaction for many students. The exercise helps students appreciate the knowledge and skills necessary to implement the local area networks used by many businesses and students on a daily basis.

AUTHOR BIOGRAPHY

Priscilla A. Arling is an Assistant Professor of Management Information Systems at the College of Business Administration, Butler University, where she teaches courses on Data and Communication Networks, Systems Analysis and Design, Knowledge Management and Information Technology. Priscilla holds a Ph.D. in Information and Decision Sciences from the University of Minnesota, and an M.B.A. from the University of Missouri-Kansas City. Priscilla's research interests include social network analysis, communication, knowledge management and systems theory.