NETWORK DESIGN TEAM (325)

REGIONAL 2018

TOTAL POINTS _____ (540)

Judges: Please double check and verify all scores and answer keys!

Description:

Analyze existing and planned business environments and develop a strategy for the implementation of a network infrastructure that addresses the business needs of the scenario provided.

Topic:

Code4Life is a 501(c) non-profit organization that works towards exposing students from low-income areas in the United States to computer programming. Originally started in the back of a mobile phone store in Chicago, IL, Code4Life has grown rapidly, and now has locations throughout twenty US states. The rapid growth is due in large part to the staff employed by Code4Life. The organization is extremely selective in their hiring process, and only accepts candidates that meet their strict requirements for personality and work ethic. This selective hiring has led Code4Life to be one of the fastest growing extra-curricular education providers in the nation, and has set them on the fast track to becoming a national sensation.

To compensate for the rate of growth, Code4Life is seeking help with its information technology infrastructure. With education and student success being the most important objectives, the infrastructure that supports the learning environment has taken a backseat to the curriculum development and staff enrichment programs. The organization is accepting proposals for technology infrastructure plans and is open to ideas both large and small. The burgeoning organization, despite its wealth of skilled technology professionals spurring its growth, is unable to accomplish the task of overhauling their infrastructure by themselves.

The facilities that the organization is looking to address are the main office where management operates from, the premier site that acts as their showcase, the high performance and talented San Francisco location, and small satellite campuses in New York City and Austin. Each facility operates as a silo of sorts when it comes to technology. As such, there are no specialized connections between the locations, nor are there any shared network management policies and methodologies. The locations' network infrastructures, or lack thereof, are managed by onsite support technicians dedicated to each facility. These technicians have varying degrees of experience, and Code4Life wants to do a lateral movement within the company for these positions so that they can have their resources reallocated. One of the goals of the technology infrastructure redesign is to create a centrally managed system capable of being maintained by a singular department.

Below is a description of the current physical layout of the organization as well as the infrastructure that is already in place.

Main Office

The organization currently occupies a small two story building in Chicago, IL as its main office. This office is home to the executives in the organization such as the chief executive officer, chief financial officer, and chief information officer. In most organizations and companies, executives usually request reports and updates from vice presidents, assistants, and receptionists. However, the executives of Code4Life prefer direct interaction with all employees and volunteers in order to maintain a warm

atmosphere of trust. As such, a fast and secure connection between this office and the other sites is extremely important.

In addition to housing the executives, the main office is also home to several departments that are integral to everyday operation. The departments include: accounting, customer support, human resources, curriculum development, and strategic planning. Each of these departments will require a dedicated method of file storage, as well as their own segmented networks to keep IP addressing schemes clean. Each department occupies its own room partitioned off using standard office cubicles. Here are the layouts for each department:

- **Accounting:**
  - Five cubicles each equipped with a single workstation and single monitor.
  - 10/100/1000 Mbps switch in a small network closet at the back of the room. Switch sits on an old coffee table with no external cooling. The switch is unmanaged.
- **Customer Support:**
  - Eight cubicles each equipped with a single workstation and dual monitors.
  - Each cubicle has a VOIP phone connected to a PBX and SIP trunk dedicated to customer support. The organization wants to implement an IVR (interactive voice response system) for customer support.
  - 10/100/1000 Mbps switch at the back of the room in a dedicated network rack with two fans for cooling. The switch is unmanaged.
- **Human Resources/Curriculum Development/Strategic Planning** (all share similar layout)**:**
  - Six cubicles each equipped with a single workstation and single monitor.
  - 10/100/1000 Mbps switch is at the back of the room in a dedicated network rack. Fan motors for external cooling are *not* functioning. The switch is unmanaged.

Each department will require its own updates, upgrades, and implementations concerning the network and technology. These will need to be provided in the proposal.

Austin, Texas:

Since Austin, TX is a hub for technology and progressive thought, Code4Life has naturally decided to place one of their main locations in the blossoming city. This location is their premier educational facility and acts as their “masterpiece” or “showcase” facility. As such, the facility is currently outfitted with three computer labs with thirty desktop workstations in each lab. The desktops are currently unmanaged and Code4Life is requesting a solution to implement virtual desktop infrastructure (VDI) to improve the efficiency, maintainability, and “cool” factor of the computer labs. Code4Life has approved the upgrade of all desktop workstations in the computer labs to state-of-the-art thin client machines that work with the proposed VDI solution.

In addition to the computer labs, there are two conference rooms and several offices for staff and faculty. The conference rooms are currently set-up as traditional conference rooms with a large table and a speakerphone in the middle of the table. These set-ups have worked thus far; however, Code4Life wants to upgrade the conference rooms to teleconference-capable rooms with video and multimedia capability. For the rest of the

facility, wireless connectivity should exist for both employees, students, and guests. These groups of people should be segmented on the network for QoS (quality of service). Wireless connectivity is provided by a distributed system of access points and is managed by a central controller in a network closet off the main hallway. All users of the wireless and wired network are lumped into a single subnet.

San Francisco, California:

The San Francisco facility is at the heart of technology and in close proximity to major players in the tech industry. While the Austin, TX office is seen as the "visual masterpiece" of the organization, the San Francisco office is seen as the "intelligence masterpiece." This unofficial designation has evolved out of the raw talent present in the nearby areas, most notably Silicon Valley. While Austin is aimed at creating an enriching environment to capture the eyes of the public, the San Francisco office is all about performance, speed, and power.

The San Francisco office occupies an old factory warehouse and is focused on "open concept" and collaborative learning. There are no computer labs, and instead learning is done in an immersive environment where mentors and students gather in an open space. Code4Life has noticed that students and employees have been complaining of wireless connectivity issues and they are wanting to upgrade the connection. Currently powered by 500 mbps fiber line, the organization is looking to upgrade the WAN (wide area network) connection as well as the internal connections. Wireless connectivity is provided by three unmanaged Wireless N access points, but the set-up is not providing enough throughput. Upgrades to the wireless network are the main concern and pain point with this location.

In addition to the wireless connection, Code4Life wants to add a small server rack complete with a storage array, VM (virtual machine) hosting capabilities, and low-traffic web hosting. There is currently no infrastructure to support these wants, so Code4Life is leaving it up to the network design contractors to implement a solution from scratch.

New York City, New York:

The New York City office closely resembles the set-up of the majority of Code4Life's locations. It is a single main room with a small office off to the back, single occupancy bathrooms, and a reception area at the front. The layout is similar to an extracurricular tutoring center or a small boutique fitness studio.

The walls are lined with economy-class desktop workstations outfitted with the different applications that support Code4Life's innovative curriculum. Code4Life wants to be able to manage all of the desktops workstations throughout its many facilities, and to be able to deploy updates and software when needed. New York City will be the first satellite site where this will be implemented, and more will follow depending on the success of the proposed solution.

Filling the center of the room are tables with surge protectors running down the middle. These tables are intended for students who wish to use their own devices instead of the ones the site provides. Wireless connectivity issues have been a problem recently, as more and more students are able to afford their own devices as prices lower due to advancing technology. The only method of wireless connection is a single SOHO (small

office home office) integrated wireless router and modem. The modem has a 100Mbps connection to the WAN (wide area network) which does not provide enough throughput for the usage of the facility. Wireless connectivity and Internet connectivity will need to be addressed in the proposal.

Customer needs:

- Propose a reasonable and thorough network design for the Chicago, Austin, San Francisco, and New York City locations
- Use subnets and VLANs to efficiently segment the entire network and provide for easier maintainability
- Address the updates needed in the main office so that the departments can function to their fullest potential
- Show a solution, or a set of possible solutions, that can solve the need for an IVR for customer support
- Propose an innovative and state-of-the-art VDI solution for the computer labs at the Austin location
- Provide a solution for a faster WAN connection as well as internal network connections, mainly wireless connectivity, in the San Francisco location
- Design a simple, yet effective, plan to support the VM hosting, web hosting, and file storage goals of the San Francisco location
- Present a solution to allow for the management of workstations that belong to Code4Life
- Show how a telepresence-capable system can be created at the Austin location

Judges Notes:

1. Network design should be reasonable and reasonably priced.
2. Addresses the needs for updates in the main office such as:
   - Switch resting on the coffee table
   - Unmanaged switches
   - Non-functioning cooling
   - Subnetting and VLANs
3. Wireless connectivity is highlighted for the San Francisco office
4. The infrastructure to support the VM hosting, web hosting, and file storage is reasonable, but not too "vanilla"
5. The Austin, TX office VDI solution conforms to industry standards and efficiency is highlighted in the proposal
6. Desktop management abilities are proposed for the New York City location

JUDGING PROCEDURE

- Teams will be introduced by team number. **Contestants may continue to wear their name badges.**
- As a team of judges, formulate two to three questions to ask at the conclusion of the presentation. Be sure to ask the same questions of each team.
- No more than three (3) minutes for set-up.
- The length of the presentation will be no more than ten (10) minutes; followed by judges' questions not to exceed ten (10) minutes.
- The presentation will be stopped at ten (10) minutes.
- Excuse teams upon completion of judges' questions.
- **There can be no ties in the top ten (10) teams.** It is the responsibility of the judges to break any ties.
- Administrator will fill out ranking sheet prior to dismissing the judges.
- If more than one (1) section is necessary, finalists will be determined by selecting an equal number from each section.
- Give administrator all Judges' Rating Sheets, Judge Evaluation Sheets and contest materials.
- No audience is allowed in the contest room.

Please double-check and verify all scores!