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| SCHOOL OF INFORMATION AND TECHNOLOGY | | |
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# SYSADM1 – Physical Infrastructure

# Instructions:

Answer the following questions based on Week 3 Lecture notes.

1. Identify potential issues in physical infrastructure setups and propose solutions to optimize performance or reduce costs

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| **Issues** | **Description** | **Solution** |
| |  | | --- | | High Costs due to Inefficient Space Management |  |  | | --- | |  |  |  | | --- | |  | | Poor space management leads to higher operational costs due to excessive energy consumption and inefficient use of space. | Implement rack optimization and modular design to better utilize space and reduce overall costs. |
| |  | | --- | | Redundancy and Reliability |  |  | | --- | |  |  |  | | --- | |  | | Without redundancy, systems may experience outages and disruptions, impacting business continuity. | Design infrastructure with redundancy, such as backup power systems and multiple network paths, to ensure reliability. |
| |  | | --- | | Improper Device Placement |  |  | | --- | |  |  |  | | --- | |  | | Poor placement of devices causes operational inefficiencies and can result in cluttered environments. | Develop a structured layout and use rack optimization techniques to improve device placement and space efficiency. |
| Cooling Efficiency | Ineffective cooling systems can cause equipment to overheat, potentially leading to failure and downtime. | Use energy-efficient cooling methods like hot aisle/cold aisle containment to manage airflow, and ensure regular maintenance to keep the cooling systems running efficiently. Also consider the environment on the device. |

1. You are a project manager responsible for implementing a new infrastructure project, such as a smart city initiative or a digital transformation strategy.
2. What IT systems and technologies are necessary to support the project's objectives?

To support a smart city project, a comprehensive set of IT systems and technologies is essential. **IoT devices** will gather real-time data on traffic, energy use, and other urban metrics. **Data analytics tools** will interpret this information, while **cloud services** offer scalable storage and computing capabilities, enabling flexible and cost-effective management of large data volumes. The **physical infrastructure** includes servers and storage systems, categorized into **primary storage** for active data and **backup storage** for disaster recovery, ensuring reliability. **Computing environments** will utilize **virtualization** to enhance scalability and performance. Essential services such as **FTP** and **SFTP** will support secure file transfers, and **NTP** will ensure accurate time synchronization across systems. The overall infrastructure will be designed to balance scalability, flexibility, reliability, security, and performance while remaining cost-effective.

1. How can the IT infrastructure be designed to be scalable and flexible?

To design the IT infrastructure for scalability and flexibility, I’ll use a modular architecture that supports easy upgrades and expansions. Cloud services will allow us to adjust resources based on demand. Virtualization will enable multiple virtual machines to run on a single physical server, optimizing resource use. I’ll also implement backup devices to ensure data protection and incase a device fails to run its tasks properly. Configurations will be set up to automatically scale resources and adjust settings based on current needs. Additionally, automation tools will manage resources efficiently and adapt to changes, while still ensuring that security measures are in place to protect the infrastructure.

1. What are the potential security risks and vulnerabilities, and how can they be addressed?

Potential security risks and vulnerabilities include data breaches, network attacks, and threats to IoT devices. To address these risks, I’ll implement strong encryption and tight access controls to protect sensitive data. Setting up intrusion detection systems and firewalls will help safeguard the network from attacks. Ensuring all devices and endpoints are secure with updated antivirus software and regular patches is crucial. To mitigate insider threats, I’ll use strict access controls and monitor for unusual activity. Securing IoT devices with strong passwords and keeping them updated will also be a priority. Additionally, I’ll ensure compliance with data protection regulations and conduct regular security audits to maintain a robust security posture.

1. How can the IT infrastructure be integrated with existing systems and processes to minimize disruption?

In integrating new IT infrastructure with existing systems, we needs to be careful in planning to minimize disruptions. As a project manager, I will first start by evaluating how compatible the new systems are with the current setup and use APIs to ensure seamless interaction between them. Before making any changes, I will back up all critical data to prevent loss or corruption. Consider using virtual machines to test the new infrastructure in a controlled environment, which helps identify potential issues without affecting your live systems. Implement the changes in phases to manage the transition gradually, and conduct thorough testing before full deployment to ensure that everything functions smoothly and operational continuity is maintained.