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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 | Solutions |
| **Scale Inefficiency**: This might be one of the biggest problems where infrastructure is scaled too much or underestimated. | Use capacity planning and cloud solutions to scale dynamically, minimizing both upfront costs and underutilization. |
| **Network bottlenecks**: Poor network design can result in higher latency, packet loss, and ultimately cause performance degradation overall. | Implement redundant paths, load balancing, and adequate bandwidth to reduce bottlenecks. Regular audits, SD-WAN, QoS policies, load balancers, and upgrading bandwidth ensure optimized network performance. |
| **Inefficiencies related to power and cooling**: Excessive power consumption and inefficient forced air or liquid-based topologies increase operational expenditure costs while reducing hardware lifespan. | Invest in energy-efficient hardware and advanced cooling systems like hot/cold aisle containment to reduce power consumption. |
| **Redundancy and failover**: No backup systems to prevent downtime in case of hardware failure or power outage. | Ensure redundancy in critical systems such as power supplies, servers, and networking equipment. High availability and disaster recovery plans like RAID, clustering, and geographically distributed data centers ensure resilience. |
| **Space Limitation**: Inadequate planning fills valuable space needed for future expansion. | Use modular server racks and data centers for future expansion without reworking the entire infrastructure. |

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?

The goals of the project’s objectives will require the use of IT technologies like cloud computing, IoT devices, AI-powered analytics, and reliable data storage solutions. Additionally crucial for connectivity and security will be technologies like edge computing, 5G, and cybersecurity platforms. In order to improve operational efficiency and maximize resource management, real-time data processing tools and automation platforms are also required.

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

I think modular frameworks that can grow and adapt should be used to create cloud-native IT infrastructure that is scalable and flexible. An infrastructure can withstand increasing workloads without affecting services thanks to tools like Kubernetes, which enable horizontal scaling.

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

Security risks such as data breaches, cyberattacks, and IoT vulnerabilities are mitigated through strong encryption, constant network monitoring, multi-tier authentication, and regular security audits. Adopting a zero-trust model and promoting cybersecurity awareness across teams can further reduce risks.

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

By integrating with current systems, standardized protocols, middleware, and APIs can facilitate data interchange and reduce interruptions throughout the transition period. Managing compatibility concerns and minimizing downtime during integration can also be achieved by carrying out thorough impact assessments and creating staggered deployment strategies.