MidTerm Exam Overview

1. What is Cloud Computing?

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- **Definition**
  - Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction. (NIST)
  - 中文說明：雲端運算是一種模型，能夠方便、隨需地存取共享且可配置的資源，並能以最少的管理努力迅速配置與釋放。
- **Different Perspectives**
  - Talk from Oracle CEO Larry Ellison
    "We've redefined Cloud Computing to include everything that we already do. I don't understand what we would do differently other than change the wording of some of our ads."
  - Talk from Rich Stallman
    "It's stupidity. It's worse than stupidity: it's a marketing hype campaign. Somebody is saying this is inevitable – and whenever you hear somebody saying that, it's very likely to be a set of businesses campaigning to make it true."
  - 中文說明：Larry Ellison 認為雲端只是舊技術包裝；Richard Stallman 則認為雲端是行銷炒作。

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2. Cloud Definitions

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- **Wikipedia**

    - Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid.
    - 中文說明：雲端運算是一種網際網路為基礎的運算模式，將資源、軟體與資訊按需提供，像電力一樣使用。

- **Whatis.com**

    - Cloud computing is a general term for anything that involves delivering hosted services over the Internet.
    - 中文說明：雲端運算泛指所有透過網路提供的託管服務。

- **Berkeley**

    - Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the datacenters that provide those services.
    - 中文說明：雲端包含了以服務形式交付的應用程式，以及背後支援的資料中心硬體與軟體。

- **Buyya**

    - A Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources.
    - 中文說明：雲端是一種由互聯虛擬化計算機組成的平行與分散式系統，按需求整合為一個或多個統一資源。

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3. Properties and Characteristics

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- **Properties**

    - High scalability and elasticity
    - High availability and reliability
    - High manageability and interoperability
    - High accessibility and portability
    - High performance and optimization
    - 中文說明：雲端必須具備高擴展性、可用性、可靠性、管理性、互通性、存取性、可攜性與效能最佳化。

- **Enabling Techniques**

    - Hardware virtualization
    - Parallelized and distributed computing
    - Web service
    - 中文說明：雲端仰賴虛擬化、分散式計算及 Web 服務技術實現。

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4. Central Ideas

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- **Utility Computing**
  - Users do not want to own the physical infrastructure. Instead, they only want to pay as many as they used.
  - 中文說明：使用者只想按用量付費，不希望擁有硬體設備。
- **Service-Oriented Architecture (SOA)**
  - Service Oriented Architecture (SOA) is essentially a collection of services which communicate with each other.
  - 中文說明：SOA 是由多個可互相通訊的服務所構成的架構。
- **Service Level Agreement (SLA)**
  - A service-level agreement (SLA) is a contract between a network service provider and a customer that specifies, usually in measurable terms, what services the network service provider will furnish.
  - 中文說明：SLA 是服務提供者與客戶之間訂立的服務品質保證合約。

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5. Scalability and Elasticity

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- **Dynamic Provisioning**
  - Cloud resources should be provisioned dynamically to meet seasonal demand variations.
  - 中文說明：雲端資源應根據需求動態調整。
- **Multi-tenant Design**
  - Multi-tenant refers to a principle in software architecture where a single instance of the software runs on a server, serving multiple client organizations.
  - 中文說明：一個系統同時服務多個客戶，每個客戶像是獨立環境。

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6. Availability and Reliability

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- **Fault Tolerance**
  - Fault-tolerance is the property that enables a system to continue operating properly in the event of the failure of some of its components.
  - 中文說明：容錯性是指部分故障時系統仍能正常運作。
- **System Resilience**
  - Resilience is the ability to provide and maintain an acceptable level of service in the face of faults and challenges to normal operation.
  - 中文說明：韌性是系統在異常時仍可快速恢復服務的能力。
- **System Security**

- Cloud security is an evolving sub-domain of computer security, network security, and information security.
- 中文說明：雲端安全屬於資訊安全領域的延伸分支。

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7. Manageability and Interoperability

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- **Autonomic Computing**
  - Its ultimate aim is to develop computer systems capable of self-management.
  - 中文說明：自主運算系統可自我管理與修復。
- **System Monitoring**
  - A System Monitor is a process within a distributed system for collecting and storing state data.
  - 中文說明：系統監控負責監測系統狀態。
- **Billing System**
  - Users pay as many as they used.
  - 中文說明：使用者依使用量付費。

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8. Performance and Optimization

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- **Parallel Processing**
  - Parallel processing is a form of computation in which many calculations are carried out simultaneously.
  - 中文說明：平行運算是同時處理多筆計算。
- **Load Balancing**
  - Load balancing is a technique to distribute workload evenly across two or more computers.
  - 中文說明：負載平衡將系統負載平均分散。
- **Job Scheduling**
  - A job scheduler is a software application that is in charge of unattended background executions.
  - 中文說明：作業排程軟體負責自動執行背景作業。

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9. Accessibility and Portability

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- **Uniform Access**

    - Users from different operating systems or other accessing platforms should be able to directly be served.
    - 中文說明：不同平台的使用者應能無縫存取服務。

- **Thin Client**

    - Thin client is a computer or a computer program which depends heavily on some other computer to fulfill its traditional computational roles.
    - 中文說明：瘦客戶端依賴伺服器完成運算。

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10. Benefits from Cloud Computing

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- **Reduce Initial Investment**

    - Enterprise do not need to own the infrastructure.
    - 中文說明：企業無需擁有硬體設備，降低初期投資。

- **Reduce Capital Expenditure**

    - Enterprise can almost dismiss its IT department.
    - 中文說明：企業可縮減 IT 部門規模，降低支出。

- **Improve Industrial Specialization**

    - Industrial specialization will be improved.
    - 中文說明：專業分工將因雲端服務而提升。

- **Improve Resource Utilization**

    - IT infrastructure performance and utilization can be optimized.
    - 中文說明：IT 資源將因集中管理而最佳化。

- **Reduce Local Computing Power**

    - Only basic hardware to connect to internet.
    - 中文說明：只需簡單裝置即可連網使用強大運算力。

- **Reduce Local Storage Power**

    - Dynamically allocated on demand.
    - 中文說明：儲存空間可依需求動態調整。

- **Variety of Thin Client Devices**

    - Accessed through small smart devices.
    - 中文說明：可使用小型智慧裝置存取雲端。

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11. Service Models

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- **IaaS**
  - Infrastructure as a Service - Provision processing, storage, networks, and other fundamental computing resources.
  - 中文說明：IaaS 提供虛擬化硬體資源。
- **PaaS**
  - Platform as a Service - Deploy onto the cloud infrastructure consumer-created or acquired applications.
  - 中文說明：PaaS 提供應用開發與部署平台。
- **SaaS**
  - Software as a Service - Use the provider's applications running on a cloud infrastructure.
  - 中文說明：SaaS 直接租用雲端應用程式。

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12. Deployment Models

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- **Public Cloud**
  - The cloud infrastructure is made available to the general public or a large industry group.
  - 中文說明：公有雲開放給一般大眾或產業集團使用。
- **Private Cloud**
  - The cloud infrastructure is operated solely for an organization.
  - 中文說明：私有雲僅限單一組織專用。
- **Community Cloud**
  - The cloud infrastructure is shared by several organizations and supports a specific community.
  - 中文說明：社群雲由多個組織共同使用。
- **Hybrid Cloud**
  - The cloud infrastructure is a composition of two or more clouds.
  - 中文說明：混合雲結合了多種雲端架構。

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13. Summary

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- **Summary**
  - Cloud computing is a new paradigm shift of computing that provides high quality properties and services.
  - 中文說明：雲端運算是一種新的運算典範，帶來高品質的特性與服務。

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