Session 8

Technological drivers of Cloud

greenwich.edu.vn

UNIVERSITY of GREENWICH
Alliance with FPT Education

Objectives

- SOA
- Virtualization
- Multicore, memory storage technology
- Web 2.0 and 3.0
- Pervasive computing

UNIVERSITY of GREENWICH
Alliance with FPT Education

Service-oriented architecture(SOA)

- SOA enables mutual data exchange between programs of different vendors without the need for additional programming or changes to the services.
- A service need not have prior knowledge of the calling application, and the application does not need to have knowledge about how the tasks are performed by a service

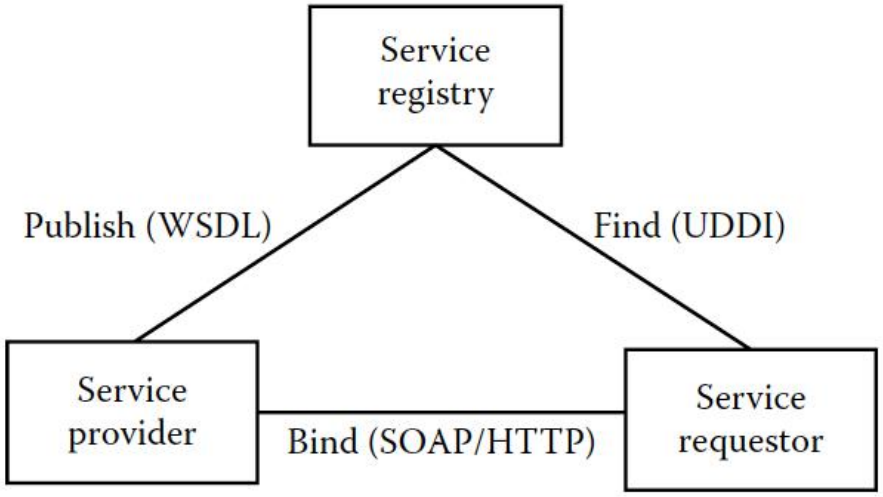
UNIVERSITY of GREENWICH
Alliance with FPT Education

Benefits of SOA

- *Reuse of services:* Various services can be reused by different applications on different platforms
- *Agility*: SOA can bring the architectural agility in an enterprise through the wide use of standards such as web services.
- *Monitoring*: It helps to monitor the performance of various services to make the required changes.
- *Extended reach*: In the collaboration between enterprises or in the case of shared processes

UNIVERSITY of GREENWICH
Alliance with FPT Education

Services architectural model of SOA

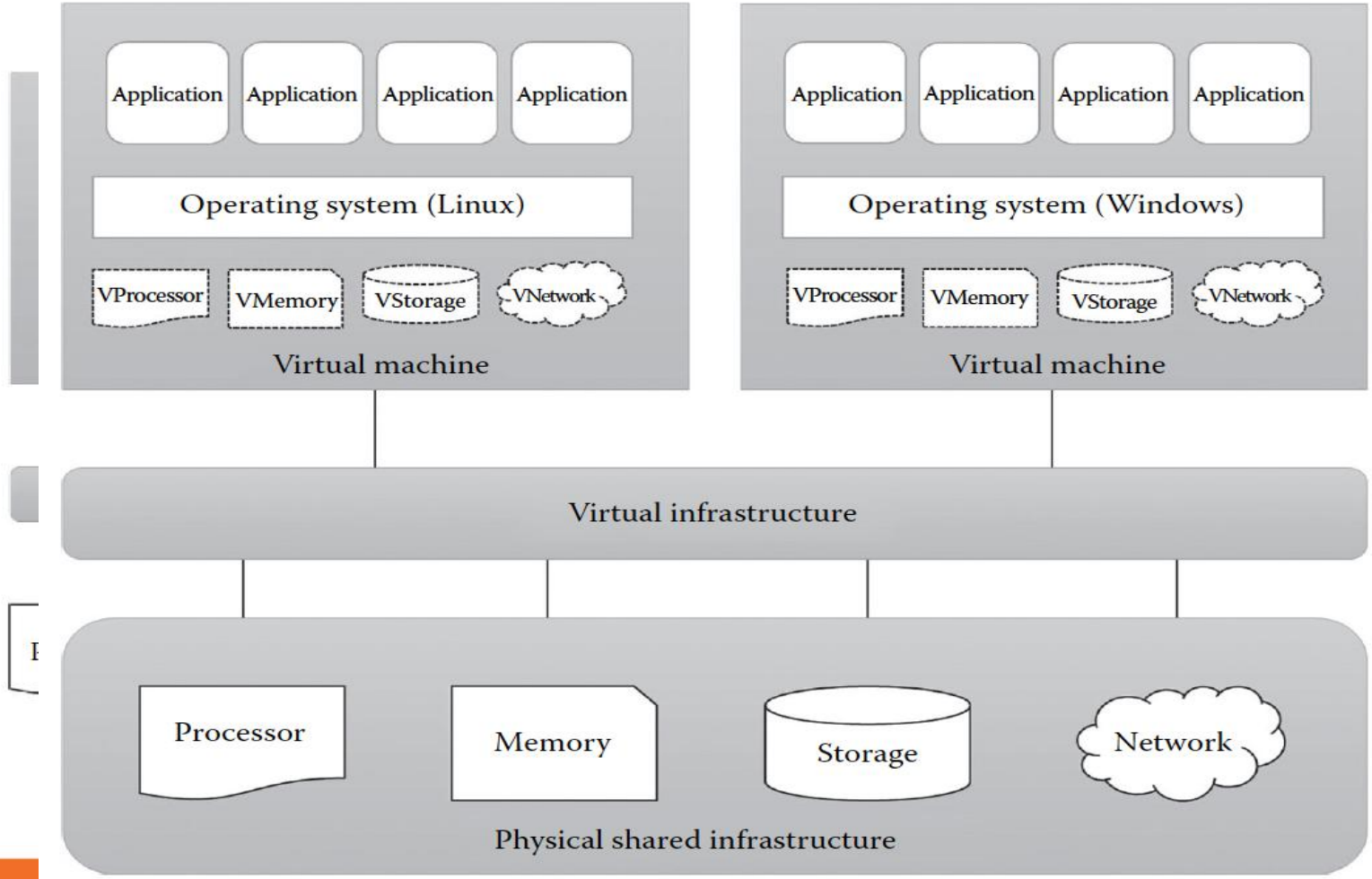


UNIVERSITY of GREENWICH
Alliance with FPT Education

Virtualization

- Virtualization is a technology that enables the single physical infrastructure to function as a multiple logical infrastructure or resources
- Virtualization is not only limited to the hardware, it can take many forms such as memory, processor, I/O, network, OS, data, and application
- It helps to improve scalability and resource utilization of the underlying infrastructure.
- It also enables the IT personnel to perform the administration task easier

OSs and applications before and after virtualization



UNIVERSITY of GREENWICH
Alliance with FPT Education

Benefits of Virtualization

- Better resource utilization
- Increases ROI
- Dynamic data center
- Supports green IT
- Eases administration
- Improves disaster recovery

UNIVERSITY of GREENWICH
Alliance with FPT Education

Drawback of Virtualization

- Single point of failure
- Demands high-end and powerful infrastructure
- May lead to lower performance
- Requires specialized skill set

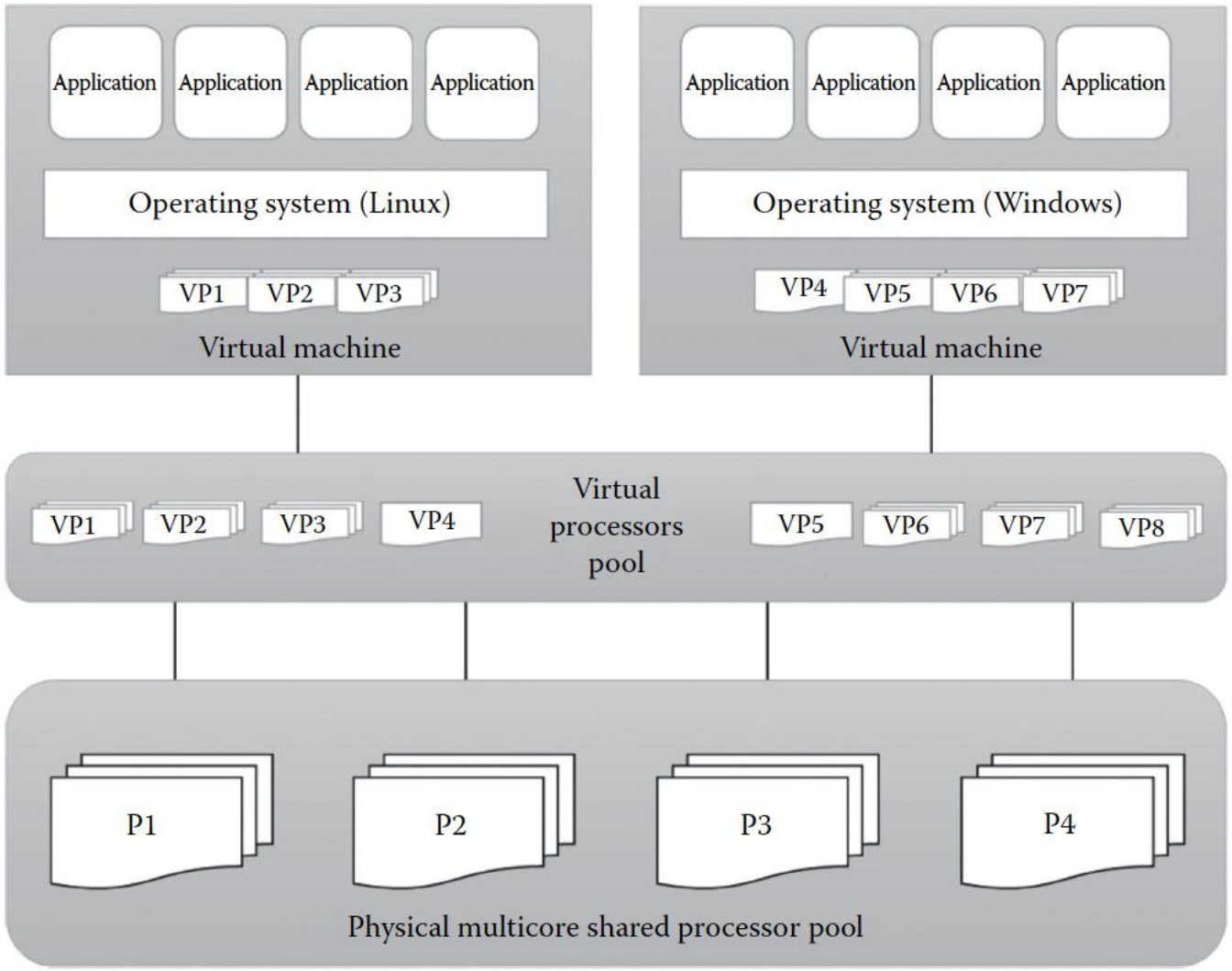
UNIVERSITY of GREENWICH
Alliance with FPT Education

Virtualization Opportunities

- The different resources like **memory**, **processors**, **storage**, and **network** can be virtualized using proper virtualization technologies.

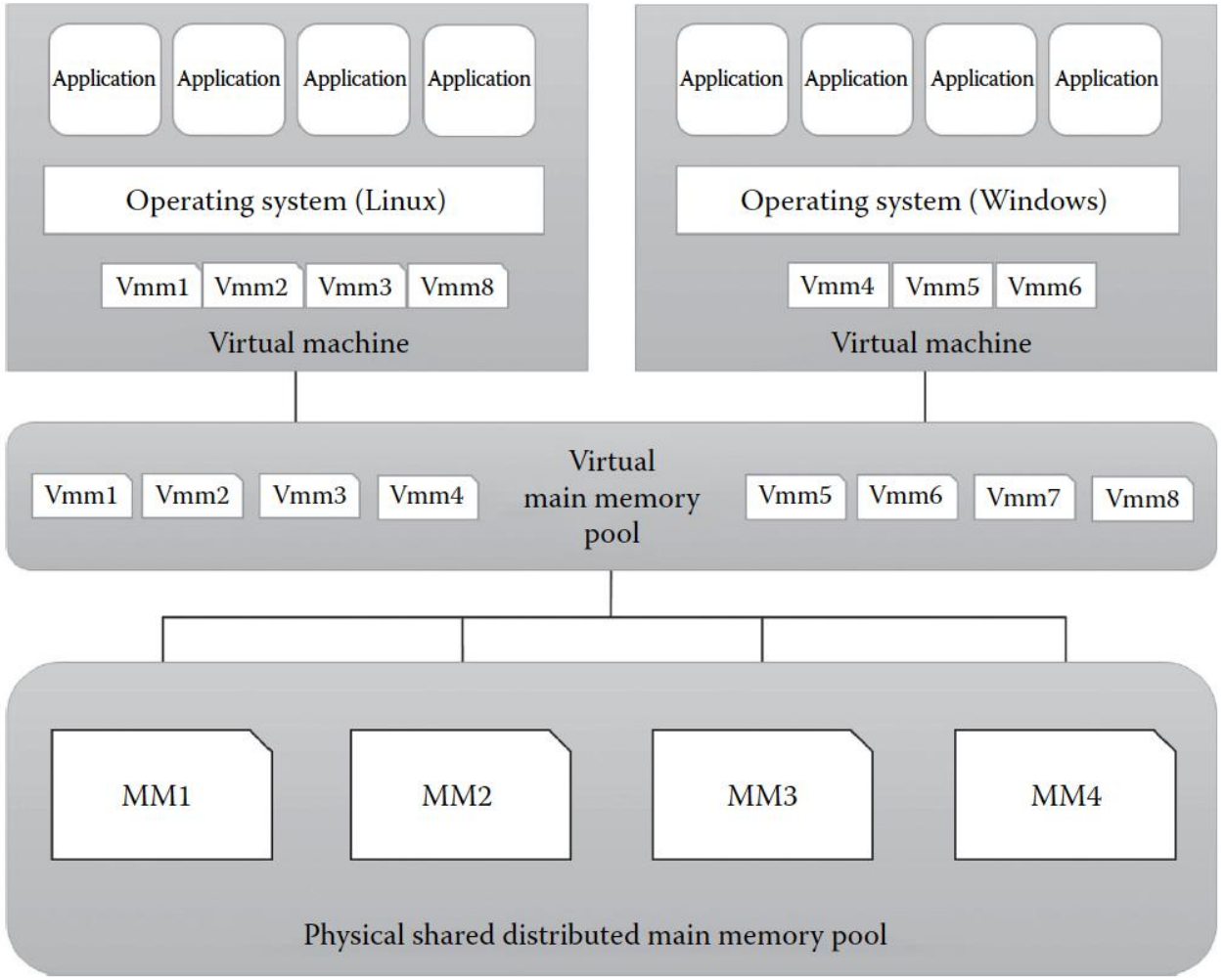
UNIVERSITY of GREENWICH
Alliance with FPT Education

Processor virtualization



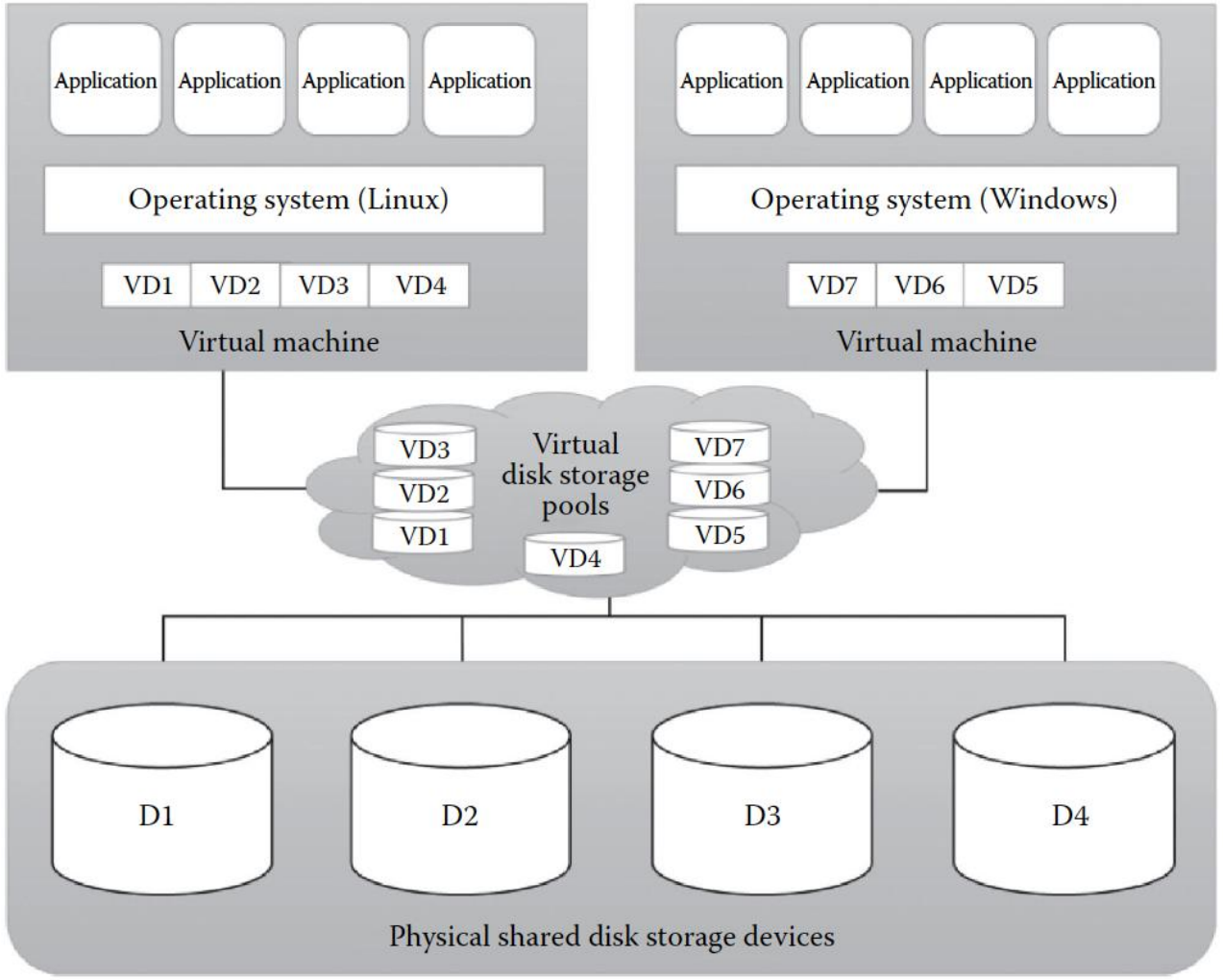
UNIVERSITY of GREENWICH
Alliance with FPT Education

Memory Virtualization



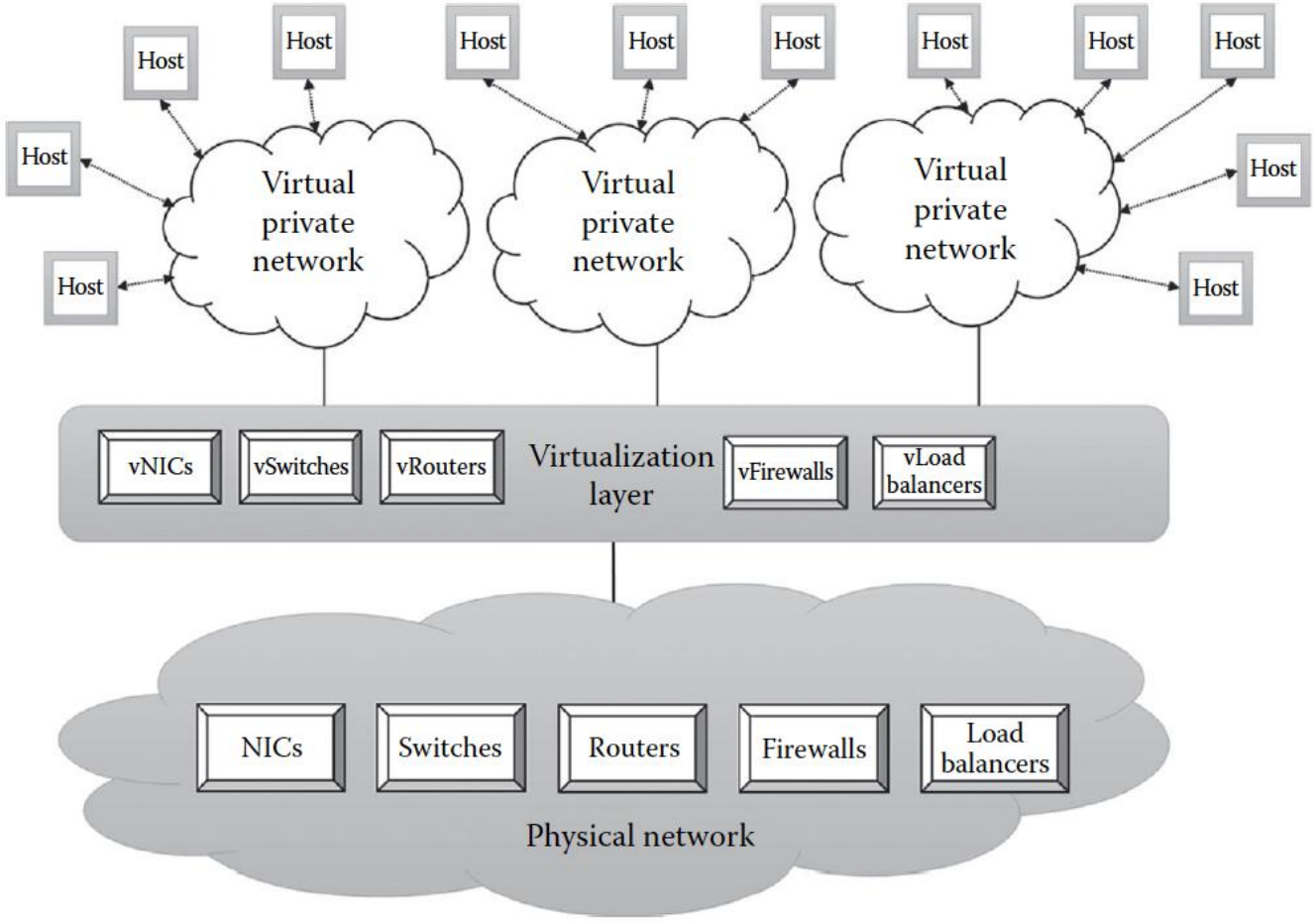
UNIVERSITY of GREENWICH
Alliance with FPT Education

Storage virtualization



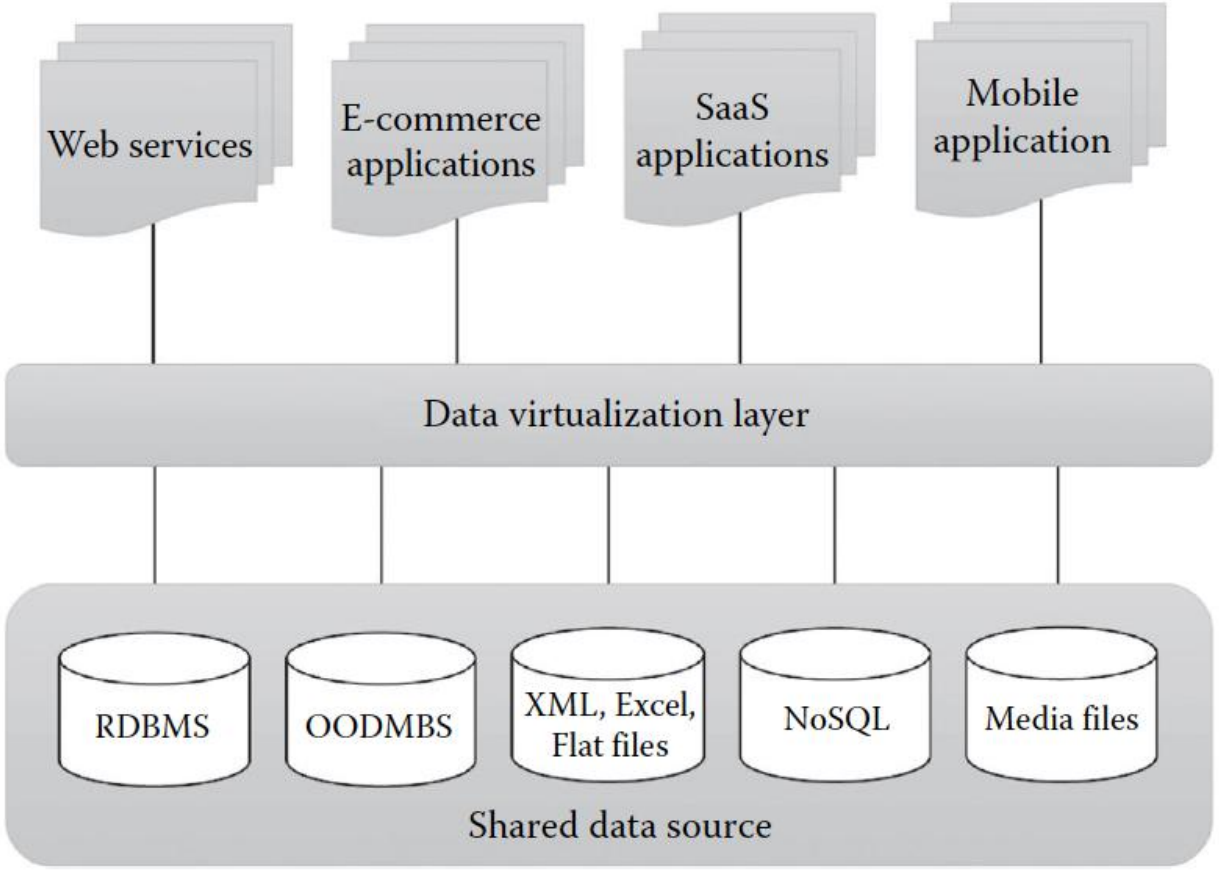
UNIVERSITY of GREENWICH
Alliance with FPT Education

Network virtualization



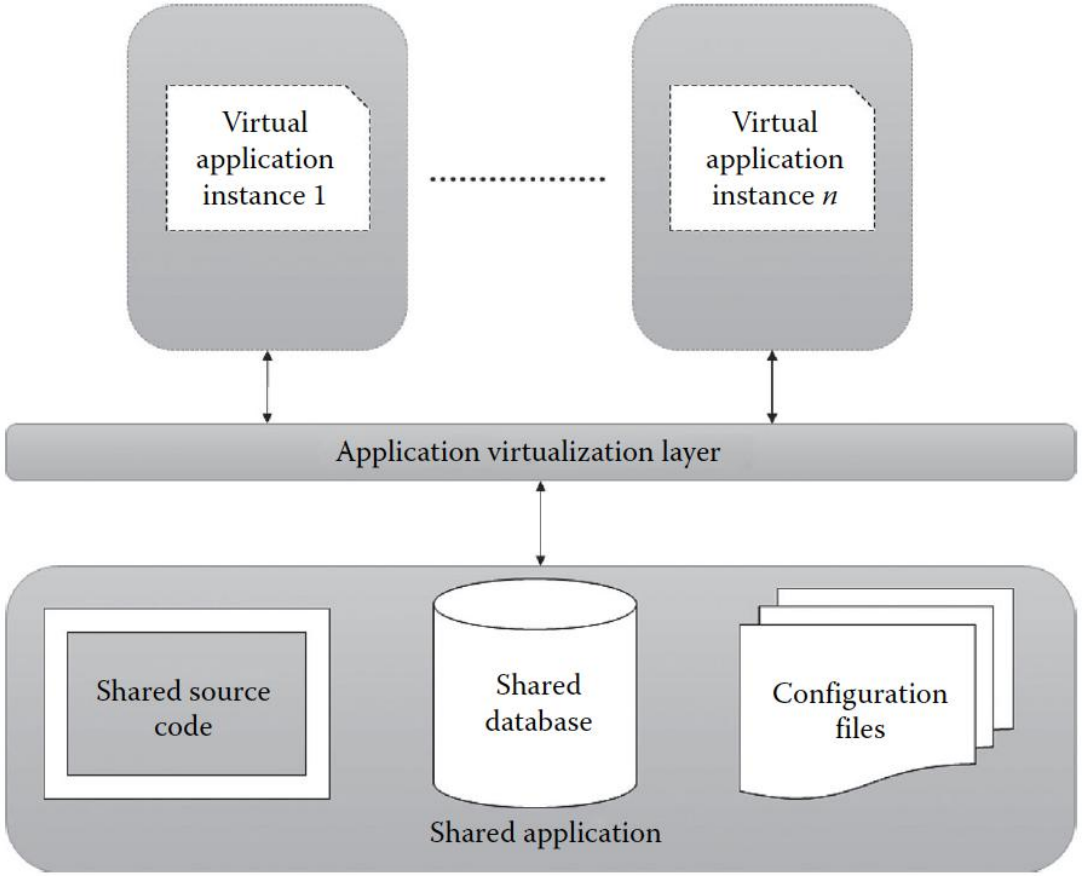
UNIVERSITY of GREENWICH
Alliance with FPT Education

Data virtualization



UNIVERSITY of GREENWICH
Alliance with FPT Education

Application virtualization



UNIVERSITY of GREENWICH
Alliance with FPT Education

Multicore Technology

- In multicore technology, two or more CPUs are working together on the same chip.
- These processors are packaged into a single integrated circuit (IC). These single ICs are called a die
- Multicore technology can also refer to multiple dies packaged together
- It also helps in reducing the power consumption and achieving more efficient, simultaneous processing of multiple tasks.
- Multicore architecture has become the recent trend of high-performance processors

UNIVERSITY of GREENWICH
Alliance with FPT Education

Memory and Storage Technologies

- The cloud storage has to deal with various kinds of data such as medical images, MP3, photos, 3D high-definition imaging, video streaming, surveillance camera captures, and film animations

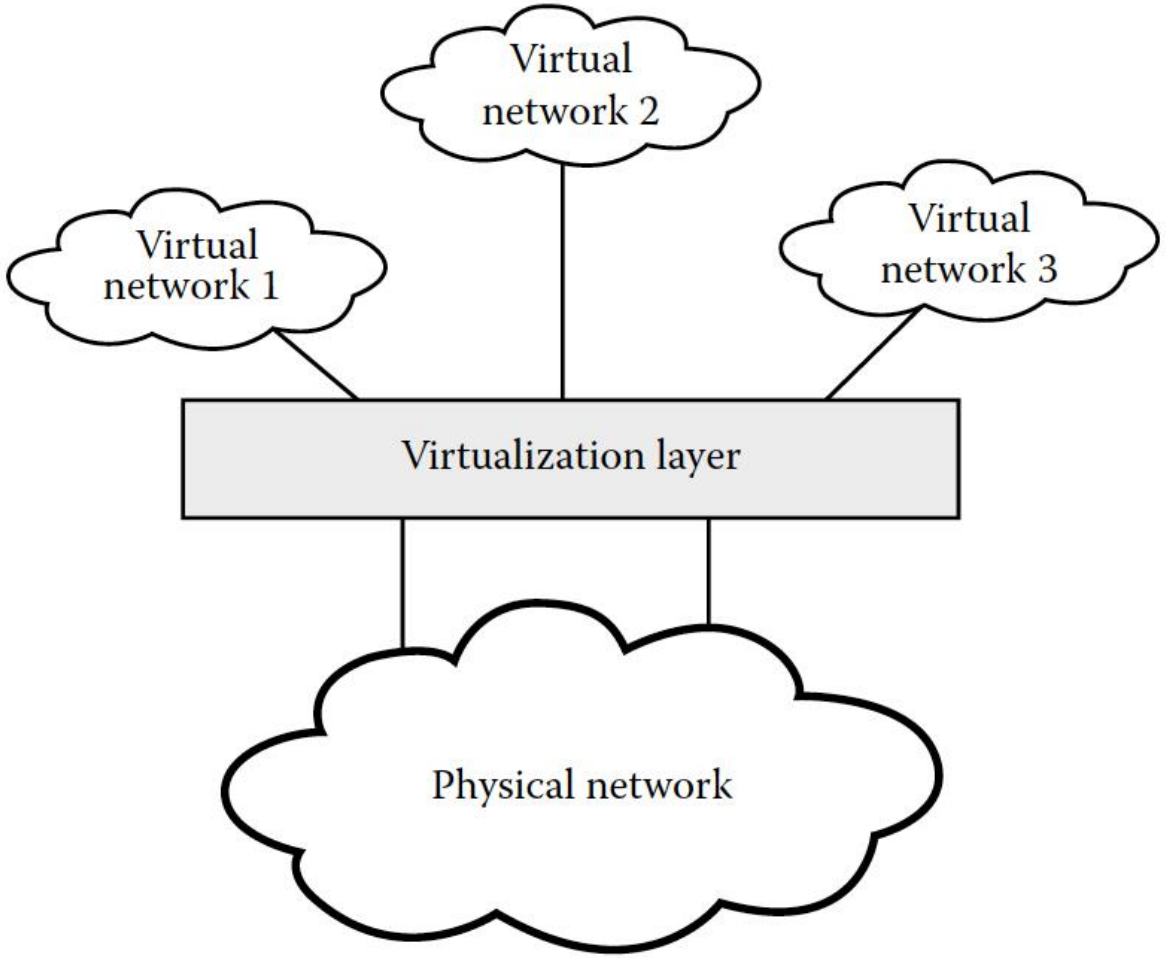
UNIVERSITY of GREENWICH
Alliance with FPT Education

Cloud Storage Requirements

- Scalability
- High availability
- High bandwidth
- Constant performance
- Load balancing

Network Requirements for Cloud

- Consolida re as a Service (Ia
- Provide V networks
- Ensure co width
- Speed ap



UNIVERSITY of GREENWICH
Alliance with FPT Education

Web 2.0

- Is the popular term given to the advanced Internet technology and applications that include blogs, wikis, really simple syndication (RSS), and social bookmarking
- Web 2.0 facilitates greater collaboration and information sharing among Internet users, content providers, and enterprises. Hence, in that sense, this can be considered as a migration from the *read-only web* to a *read/write web*

UNIVERSITY of GREENWICH
Alliance with FPT Education

Web 2.0 examples

- BookFinder4U allow the users to upload book reviews to the site and also help the users find rare and out-of-print books at a reasonable price
- Wikipedia permit users not only to read the stored information but also to create and edit the contents of the information database in multiple languages

UNIVERSITY of GREENWICH
Alliance with FPT Education

Web 3.0

- It refers to the third generation of Internet-based services that is collectively called *the intelligent web*
- Includes services on the Internet that use technologies such as semantic web, natural language search, machine learning, recommendation agents, and artificial intelligence to achieve machine-facilitated understanding of information in order to provide a more productive and intuitive experience to the web users

UNIVERSITY of GREENWICH
Alliance with FPT Education

Web 3.0 examples

- The Facebook Open Graph is a great example for the scalability feature offered by Web 3.0
- The *Like* button provided by Facebook could be considered as a simple manifestation of all these because a single click can offer the analysts an invaluable amount of information that could later be used for further communication with friends and also to make recommendations and discoveries.
- Search Optimization and Web Commerce: Best Buy

UNIVERSITY of GREENWICH
Alliance with FPT Education

Programming Models in Cloud

- There are different programming models that are used for solving various compute- or data-intensive problems in cloud
- The model to be selected depends on the nature of the problem and also on the QoS expected from the cloud environment

UNIVERSITY of GREENWICH
Alliance with FPT Education

Programming models example

- Bulk synchronous parallel (BSP) model has been widely applied in parallel databases, search engines, and scientific computing
- MapReduce Model is able to support convenient access to the large-scale data for performing computations while hiding all low-level details of physical environments
- SAGA is a high-level programming interface that provides the ability to create distributed applications in an infrastructure-independent way
- Transformer: various models such as MapReduce , Dryad, and All-Pairs can be built
- Grid Batch Framework: an alternative to parallel computational models

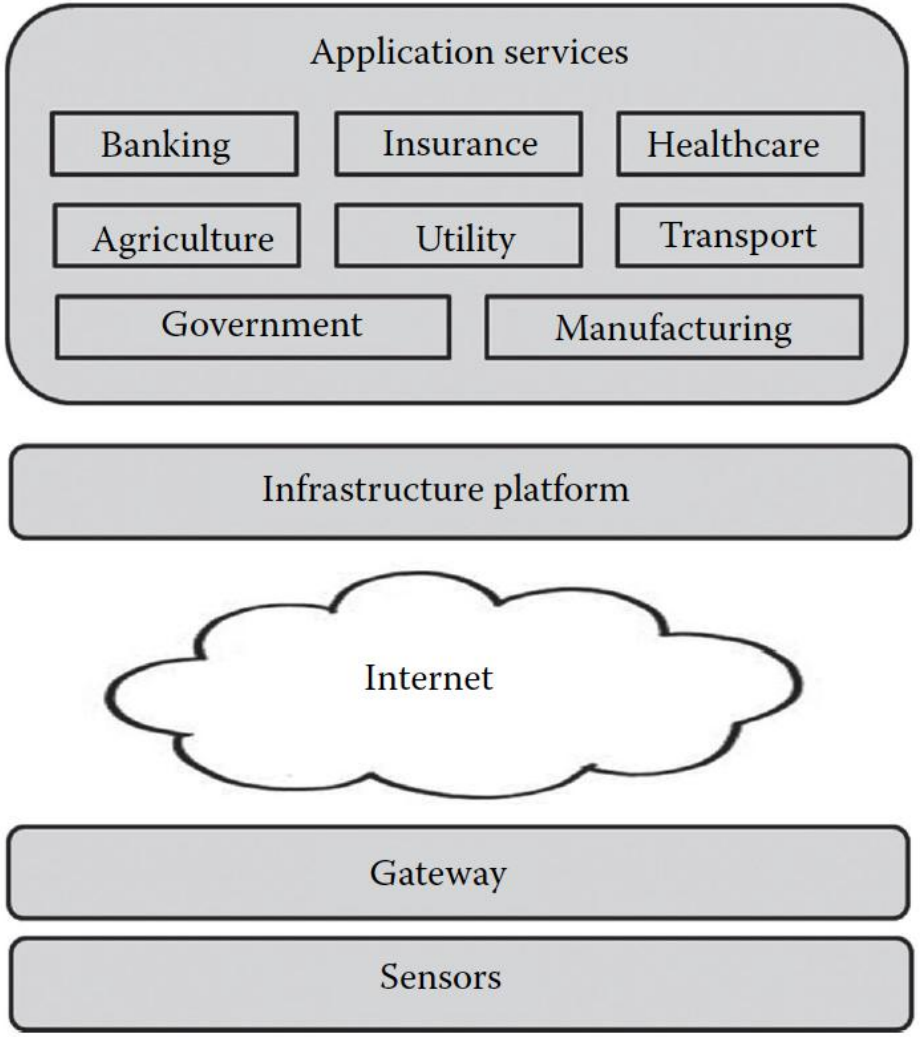
UNIVERSITY of GREENWICH
Alliance with FPT Education

Pervasive Computing

- Is a combination of technologies, such as Internet capabilities, voice recognition, networking, artificial intelligence, and wireless computing, used to make computing anywhere possible
- Pervasive computing is also called ubiquitous computing
- The words pervasive and ubiquitous mean *existing everywhere*

UNIVERSITY of GREENWICH
Alliance with FPT Education

Pervasive computing stack



UNIVERSITY of GREENWICH
Alliance with FPT Education

Summary

- SOA
- Virtualization
- Multicore, memory storage technology
- Web 2.0 and 3.0
- Pervasive computing