20240327HW

Homework

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Ex1: Online vs Offline extraction. Example?

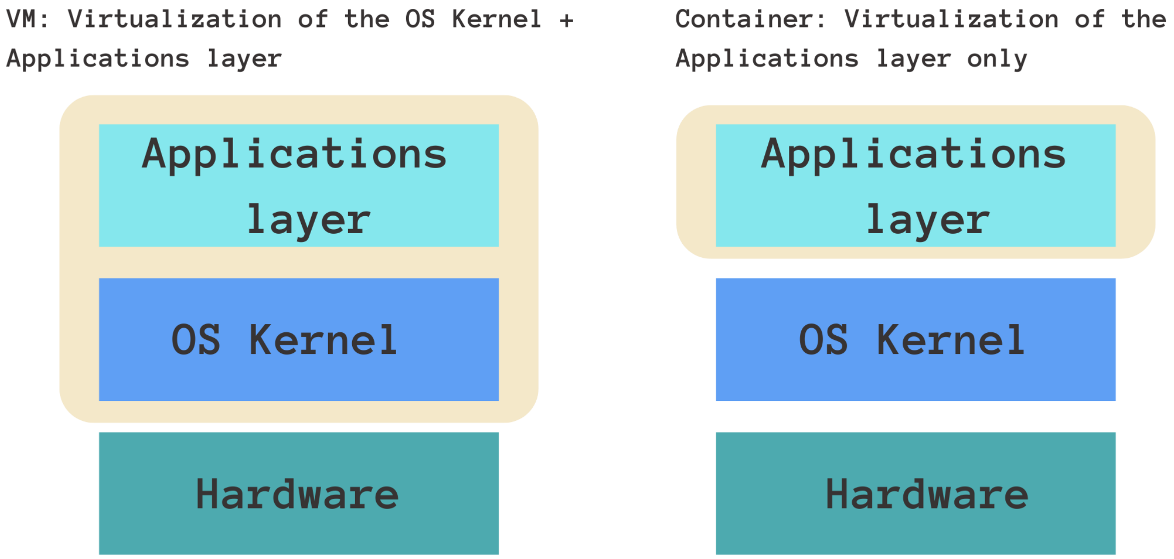
	Online extraction	**Offline extraction**
Definitions	Online extraction is the process of extracting data by interacting directly with the data source (querying a database, API, etc.), in real-time or near real-time	Offline extraction entails extracting data from the source and storing it elsewhere, such as dump files, archive logs, backups, or data lakes. This is used when real-time interaction with the data source is not feasible or practical
Use cases	Online extraction is used when there is a need for real-time analysis (sales, stocks, etc.) or the data tends to change quickly and dynamically	Offline extraction is used when there is no need for real-time analysis, such as for studies, historical trend analysis, periodical reporting, etc.
Examples	A retail company analyzes real-time sales trends by maintaining a direct connection to continuously access the latest transaction data	Daily logs are extracted and stored in a data lake. These logs are later accessed for various purposes

Ex2: ETL vs ELT?

	ETL	**ELT**
Meaning	Extract Transform Load	Extract Load Transform
Process	Extract data from various sources, transformed according to business rules or requirements, and then loaded into a data warehous or data mart	Extract data, load it into a storage system (like a data lake or data warehouse) in its raw form, and transformation occurs later, often within the storage system itself or during query execution
Advantages	Assure data quality, as all data are cleansed, transformed and normalized before storing in DW	Preserve the entire raw data, offering flexibility for various use cases
Disadvantages	May result in missing some parts of the data due to pre-	Requires more storage

	ETL	ELT
	transformation	
When to use	Suited for smaller datasets or when transformation requirements are well-defined and consistent	Preferred for handling large volumes of data and scenarios where data structures and transformation needs may vary over time or across different analytical purposes (like large company's data)

Ex3: Virtual Environment vs Virtual Machine vs Container.


VM: Virtualization of the OS Kernel + Applications layer
Applications layer
OS Kernel
Hardware
Container: Virtualization of the Applications layer only
Applications layer
OS Kernel
Hardware

	Virtual Environment	Virtual Machine	Container
Definitions	A self-contained directory tree that contains dependency details, allowing each application install and manage their own dependencies	An emulation of a physical computer, runs their own instance of the OS Kernel and applications, mostly isolated from the host system	A software instance that encapsulates the application and its dependencies
How they do it	Let application install their own dependencies inside a directory separated from the global environment	Use hypervisor which abstracts the hardware physical resources, allow the VM use the resources without relying on host system	Some kernel technologies like namespaces and control groups (cgroups)
What they use	Utilizes the computer's hardware (CPU,	Use the computer's hardware (CPU, memory,	Use the computer's

	Virtual Environment	Virtual Machine	Container
	memory, storage), OS kernel, and applications. Only separates the dependency packages	storage), but use its own OS kernel and applications	hardware (CPU, memory, storage) and OS kernel
Isolation level	Isolate the dependency packages inside the environment	Isolate the OS kernel and the applications inside it, encapsulating the whole operating system (high level of isolation).	Isolate at the application level, shares the OS kernel.
Portability	Has limited portability due to differences in system architectures and dependencies	Portable across systems, as it encapsulates the entire operating system, but there might still be compatibility issues due to hypervisor incompatibility	Portable across systems, as it packages applications and their dependencies
Use cases	Suitable for different projects on one machine, or when all team members have the same OS	Used for projects that require a high level of isolation or OS-specific configurations	Commonly used in software development or team projects