COS221
Group Assignment 4

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Contents

Data-Center Table

Datacenter															
Datacenter								Room				Warehouse			
MTXid	Name	Location	Address	PlantSpecialists	EnergyConsumption	NumberOfServers	RackCount	RoomId	Capacity	RoomType	RoomName	WarehouseNo	Capacity	WarehouseName	WarehouseStatus

- Columns in Green are suggested groupings for nested attributes.
- Columns in Red are identified candidate keys for the relation.

Task 1 -Functional Dependencies

Determining Attribute	Determines	Functional dependency 1	Functional dependency 2	Functional dependency 3	Functional dependency 4
MTXid	->	Name	Address	WareHouseNo	RoomID
RoomID	->	Room - Capacity	RoomType	RoomName	
WareHouseNo	->	Warehouse - Capacity	WarehouseName	WarehouseStatus	
NumberOfServers	->	RackCount	EnergyConsumption		
Address	->	Location			
Room - Capacity	->	RackCount			
WareHouse - Capacity	->	Room - Capacity			
Room - Capacity	->	NumberOfServers			
MTXid, RoomID, WarehouseNo	->	PlantSpecialist			

Task 2- Candidate Keys

Candidate Key	Rationale
MTXid	Determines the datacenter major
RoomID	Determines the room in the datacenter
WareHouseNo	Determines a warehouse making up part of a datacenter

Task 2- Suggested Foreign Keys (to existing and potential relations)

Foreign Key	Rationale
PlantSpecialists	Links to project table with project ID or has a singular emplID

Energy Equipment Table

EnergyEquipment														
EnergyEquipment										Rectifier				
EquipmentID	EqName	Rating	Utilization	ServiceStatus	CommsProtocol	Location	MTXid	Model	SerialNumber	RectID	RectCapacity	RectUtilization	ActiveAlarms	ServiceDate

Continued:

UPS-Service				Generator					Transformers			
UPSNo	UPSCapacity	UPSUtilization	UPSStatus	GenID	GenCapacity	GenUtilization	ActiveAlarms	ServiceDate	TransformerID	TransformerID	TransformerRating	TransformerUtilzation

- Columns in green are suggested nested attributes.
- Columns in gold are suggested candidate keys.

Task 1 Functional Dependencies

Determining Attribute	Determines	Functional dependency 1	Functional dependency 2	Functional dependency 3	Functional dependency 4	Functional dependency 5	Functional dependency 6	Functional dependency 7	Functional dependency 8
EquipmentID	->	EqName	Rating	Utilization	ServiceStatus	CommsProtocol	Location	Model	SerialNumber
GenID	->	GenCapacity	GenUtilization	ActiveAlarms	ServiceDate				
RectID	->	RectCapacity	RectUtilization	ActiveAlarms	ServiceDate				
UPSNo	->	UPSCapacity	UPSUtilization	UPSStatus					
TransformerID	->	TransformerID	TransformerRating	TransformerUtilzation					
Model	->	Utilization	Rating						

Task 2- Candidate Keys

Candidate Key	Rationale
EquipmentID	Identifies the equipment
RectID	Identifies the rectifier
UPSNO	Identifies the UPS device
GenID	Identifies the generator
TransformerID	Identifies the transformer

Task 2- Suggested Foreign Keys (to existing and potential relations)

Foreign Key	Rationale
MTXid (given)	Given in the relation and is identified as a foreign key

Server Table

Server											
ServerID	ServerName	RackID	RackLabel	Model	SerialNumber	ProcessorDetails	Utilization	Vendor	VMNames	VMCount	ResponsibleStaff

- Columns in gold are suggested candidate keys

Task 1 Functional Dependencies

Determining Attribute	Determines	Functional dependency 1	Functional dependency 2	Functional dependency 3	Functional dependency 4
ServerID	->	ServerName	VMNames	VMCount	RackID
SerialNumber	->	ProcessorDetails	Vendor	Model	
RackID,SeverID	->	SerialNumber	ResponsibleStaff		
RackID	->	RackLabel			

Task 2- Candidate Keys

Candidate Key	Rationale
ServerID	Identifies the server
RackID	Identifies the rack which may hold 1 to many servers

Task 2- Suggested Foreign Keys (to existing and potential relations)

Foreign Key	Rationale
MTXid	What center does the server belong to
RoomID, WareHouseNo	Where in the center the rack is contained
VMCodes	Relate to a VM table instead of a composite attribute VMNames
ResponsibleStaff	StaffID or links instead to the ProjectID table to all responsible staff or another new relation

Staff Table

Staff											
EmplID	Name	Address	PhoneNumber	Department	EmergencyContacts	ProjectID	ProjectName	HoursInDataCenter	Supervisor	Age	HealthStatus

- Columns in gold are suggested candidate keys

Task 1 Functional Dependencies

Determining Attribute	Determines	Functional dependency 1	Functional dependency 2	Functional dependency 3	Functional dependency 4	Functional dependency 5	Functional dependency 6	Functional dependency 7	Functional dependency 8
EMPLID	->	Name	Address	PhoneNumber	EmergencyContact	ProjectID	HoursInDataCenter	Age	HealthStatus
ProjectID	->	Supervisor	Department	ProjectName					

Task 2- Candidate Keys

Candidate Key	Rationale
EmpID	Identifies the employee
ProjectID	Identifies the ProjectName and Department

Task 2- Suggested Foreign Keys (to existing and potential relations)

Foreign Key	Rationale
ProjectID	Relate to a more detailed project relation
EmergencyContactID (or use EmergencyContact)	Relate to a table with the emergency contacts details
MTXid,RoomID,WareHouseNo	Relate to where they work (this may also be linked relationally through projectID perhaps)

Task 3 -Suggested extra relations

ServerUtilization	DCIM’s have a goal of monitoring the usage of the system to identify efficiencies and redundancies within the system.

Attributes

ServerID	RackID	PeakEnergyCosnumption	PeakEnergyDuration	IDLE_Consumption	IDLE_Duration	DiskUtilization_Average	Peak_DiskUtil	Lowest_DIskUtil

Recovery Systems	DCIM aim to identify points of critical risk and redundancy within a datacenter such that no data is lost because of some sort of incident. Server can be chained MainServer – BackUpServer – MainServer depending on the number of backups and levels of redundancies desired with a certain raid level.

Attributes

MainServer (ServerID)	BackUpServer (ServerID)	LastBackUp	RaidLevel

AirFlow_Logistics	DCIM companies are hiring mechanical engineers to design the airflow of the racks/ server blocks in the center rooms to be more temperature efficient and increase server performance under intense load

Attributes

RoomID	AirflowEngineer (EMPLid)	HighestTemp	High_duration	LowestTemp	Low_duration	dailyPowerConsumption

CounterMeasureSystems	The monitoring systems of a datacenter are important in determining any possible flaws in protecting the datacenter physically and electronically

Attributes

RoomID	CoolingType	UPSID	AirControlEngineer	TemperatureControlSystemID	SiteMonitorID (staff member)	AI_MonitoringSystemID	SecuritySoftwareID

SoftwareUtilities	Software utilities which are applied to certain servers, racks, rooms, or warehouses this may be based on the DCIM contract of the client (if independently contracted)
Attributes	

ServerID	SofwareID	SoftwareName

Clients	DCIM’s may be independently contracted by a company to solve all their DCIM requirements. This may be extended with a table for linking the relevant servers, rooms, warehouses, software etc. to the client

Attributes

ClientID	ClientName	ContactDetails	LengthOfContract	ResponsibleEmployee

Possible tables inferred from given tables:

- Project table for projects
- Datacenter locations table
- Virtual Machines table
- Emergency Contact details table