VIRTUALIZATION PROJECT

CET IT4044FP

Individual - 1

19th February 2022

Priya M

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Schedule and Responsibilities of Members

Name	Role	Branch Office	Responsibilities	✓	Completion Date	Status
Snape	IT Engineer	**Maldives** Application Server NET.framework	1) Configure SGMgmtClient 2) Setup ESXi-200 (Main) 3) Install .NET Framework on Windows Server 2012 4) Create user administration 5) Monitoring and alert management a. Benchmark normal operations b. Configure alert type, triggers, and conditions 6) Ping to all client devices, Singapore and Frankfurt + Frankfurt backup		19TH February 2022	Pending for completion
Priya	IT Engineer	**Singapore (HQ)** Web Server Apache	1) Install VCSA 2) Install NAS Storage (Linux) 3) Install OS Linux Debian GNU and install Apache 4) Synchronize NTP time.windows.com. 5) Ping to all client devices, Maldives and Frankfurt + Frankfurt backup 6) Resources allocation to individual VMs – CPU – RAM – Storage – Host names allocation – IP address allocation		19TH February 2022	Pending for completion
Hagrid	IT Engineer	**Frankfurt + Backup** Storage Server MySQL database	1) Setup ESXi-220 (Backup) 2) Add ESXi-220 to CRME-DC in vSphere Web Client 3) Install MySQL database on Windows Server 2012 4) Ping to all client devices, Singapore and Maldives 5) Manage backup and recovery procedures – Storage: Live storage migration 6) Manage moving VMs to off-site servers – Backup: offline migration and live migration		19TH February 2022	Pending for completion

Table 1: Schedule and responsibilities of members

CURRENT VIRTUALIZATION INFRASTRUCTURE

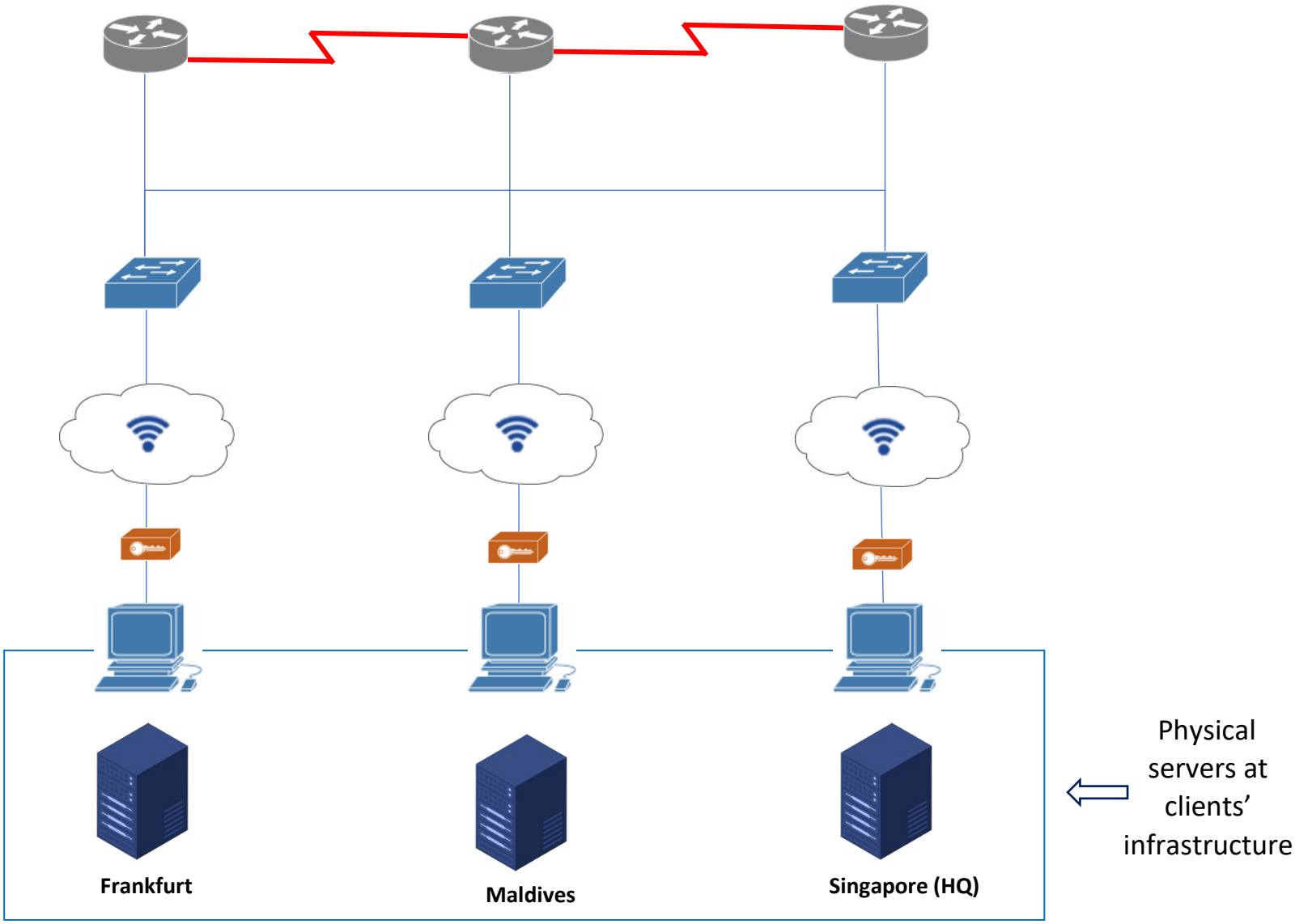


Fig 1: Current infrastructure

Why Virtualization

Current Challenges – Physical infrastructure

Growing existing architecture has become too expensive

Existing architecture is continuously overprovisioned to handle growth

Deployment of existing architecture take at least a week.

Reliability and on-site performance issues occurs.

Solutions - Data Center Virtualization & Cloud Infrastructure

Virtualization Server

Application Virtualization

Desktop Virtualization

Storage Virtualization

We recommend VMware vSphere Enterprise Plus license. Resource management, simplified lifecycle management, intrinsic security, & Resiliency and performance for enhanced applications.

Price: $4,494.00

(Includes license and production support team)

Simplified Lifecycle Management	***Intrinsic Security***	***Performance and Resiliency for Application Acceleration***
Simplify VMware software patching and firmware upgrades.	*Secure infrastructure, data, and access with a comprehensive, built-in architecture and a simple, policy-driven model.*	*vMotion provides non-disruptive operations, irrespective of the size of VMs. It is ultra-fast storage at a lower cost.*

IT MEMBERS' INTERNAL VIRTUALIZATION PLAN

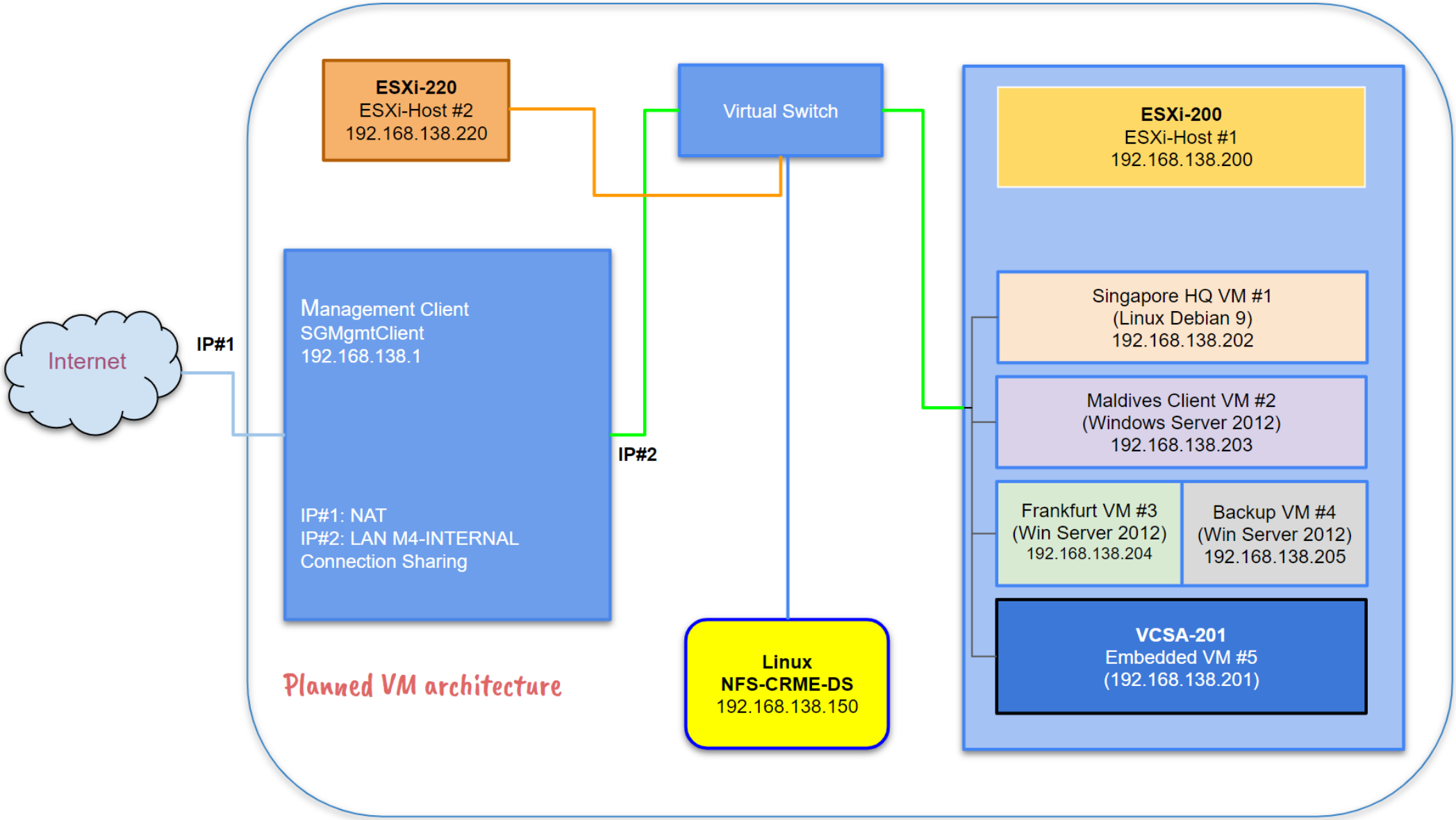


Fig 2: IT Members' Internal Virtualization Plan

PROPOSED TO CLIENT OF NEW VIRTUALIZATION ARCHITECTURE

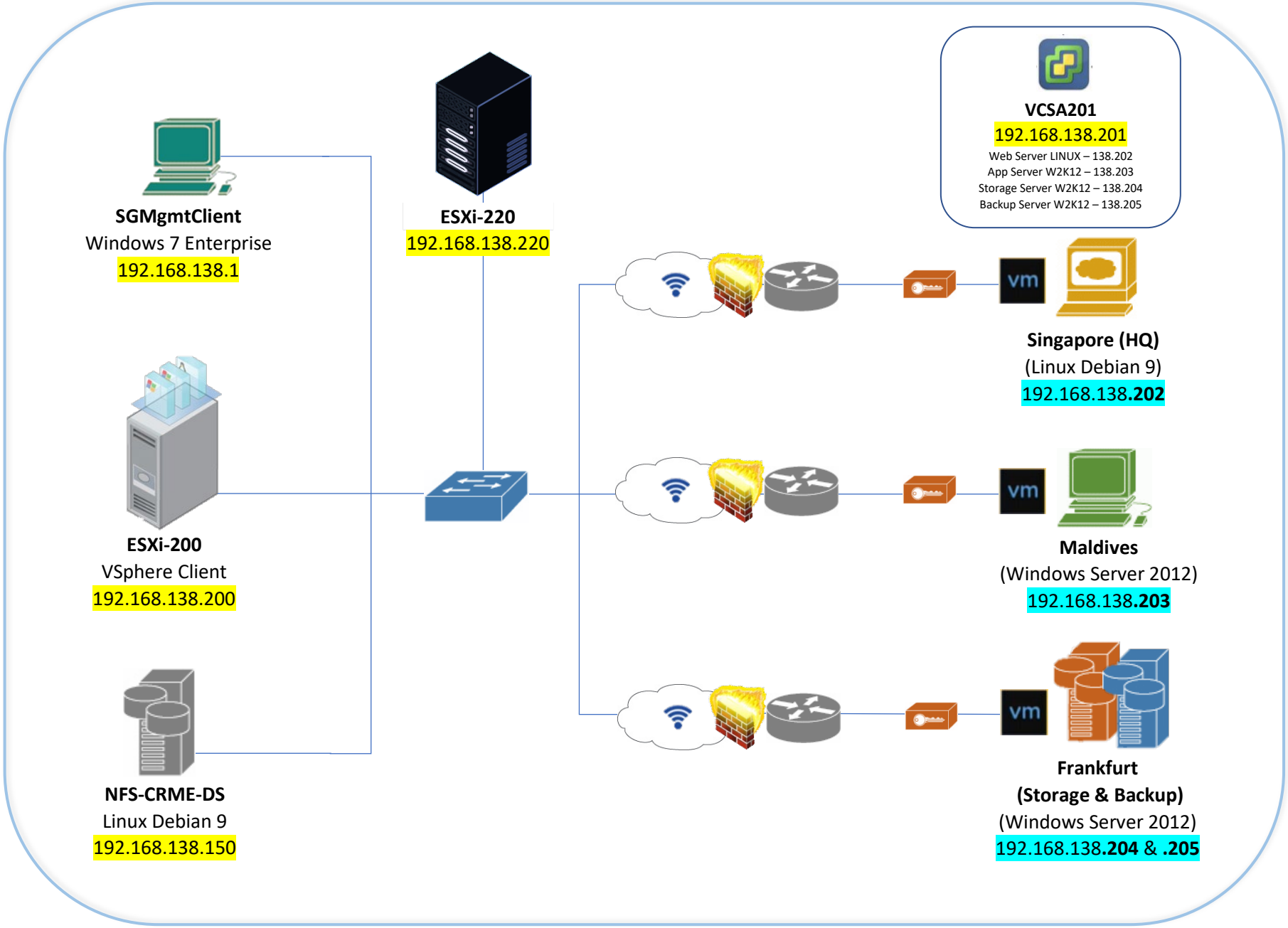


Fig 3: Proposed new infrastructure - logical topology

Deployment details of Proposed New Architecture

Locations	Servers	OS	VM Name	Domain	Hostname	Addressing	Information
Singapore	**Web**	**Linux** Debian 9 GNU	SG_CRM	crme.local	crmesglinux	**IP address /class** 192.168.138.202 /24 **Gateway** 192.168.138.1	**Apache** HTTP server Web pages requested by client computers
Maldives	**Application**	**Microsoft** Windows Server 2012 Standard Edition	MV_Apps	crme.local	crmeMVDotNet	**IP address /class** 192.168.138.203 /24 **Gateway** 192.168.138.1	**Net Framework** It is a software development platform for building and running Windows applications.
Frankfurt	**Storage**	**Microsoft** Windows Server 2012 Standard Edition	FRT_Storage	crme.local	crmeFRTSQL	**IP address /class** 192.168.138.204 /24 **Gateway** 192.168.138.1	**MySQL database** For data warehousing, e-commerce, and logging applications.
Frankfurt	**Storage**	**Microsoft** Windows Server 2012 Standard Edition	FRT_Backup	crme.local	crmeFRTBackup	**IP address /class** 192.168.138.205 /24 **Gateway** 192.168.138.1	**Storage** For data backup and disaster recovery

Table 2: Deployment details of Proposed New Architecture

Clients (Not nested)	IP Address
SGMgmtClient	192.168.138.1
ESXi-200	192.168.138.200
ESXi-220	192.168.138.220
VCSA	192.168.138.201
NFS Datastore	192.168.138.150

Table 2.1: Clients' IP Addressing

Specifications of Proposed New Architecture

	Management Client	vSphere Client	vCenter Server Appliance 6.0	NFS Storage	Singapore Data Centre	Maldives Data Centre	Frankfurt & Backup Data Centre	
Proprietary	Microsoft	VMware	VMware	Linux	Linux	Microsoft	Microsoft	Microsoft
OS	Windows 7 Enterprise	VMware ESXi 6.0	SUSE Linux Enterprise Server 11	Debian 9 GNU		Windows Server 2012 Standard Edition		
Hostname	SGMgmtClient	ESXi-200 ESXI-220	VCSA201 VCSA221	NFS-DS	crmeSGlinux	crmeMVDotNet	crmeFRTSQL	crmeFRTBackup
Domain	*NIL*	mshome.net, crme.local	*NIL*	mshome.net	crme.local	crme.local	crme.local	crme.local
IP Address	**192.168.138.1**	**192.168.138.200** **192.168.138.220**	**192.168.138.201** **192.168.138.221**	**192.168.138.150**	**192.168.138.202**	**192.168.138.203**	**192.168.138.204**	**192.168.138.205**
Subnet Mask	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0
Gateway	*NIL*	192.168.138.1	192.168.138.1	192.168.138.1	192.168.138.1	192.168.138.1	192.168.138.1	192.168.138.1
Net. Adapter	NAT	Lan Segment	Lan Segment	Lan Segment	Lan Segment	Lan Segment	Lan Segment	Lan Segment
Net. Adapter 2	Lan Segment	*NIL*	*NIL*	*NIL*	*NIL*	*NIL*	*NIL*	*NIL*
VM Network	*NIL*	*Mgmt Network*	VM Network	*NIL*	VM Network	VM Network	VM Network	VM Network
VM Name	*NIL*	192.168.138.200 192.168.138.220	VCSA201 VCSA221	NFS_Datastore	SG_CRM	MV_APPS	FRT_SQL	FRT_Backup
CD/DVD	OVA	OVA	Import ISO	Import ISO	Import ISO	Import ISO	Import ISO	Import ISO
CPU / vCPU	1	2	2	1	1	2	2	2
Hard Disk	30GB	80GB | 80GB	2GB	20GB	16GB	15GB	15GB	15GB
Processors	1	2	2	1	1	2	4	4
RAM	2GB	8GB	8GB	2GB	2GB	8GB	8GB	16GB
Disk Provision	*NIL*	*NIL*	Thin	*NIL*	Thin	Thin	Thick Provision Eager Zeroed	same format as the source
Data Store	Default	Default	Default	*NIL*	Default	Default	Default	Default
Nested VMs	*NIL*	*NIL*	*NIL*	*NIL*	in ESXi-200	in ESXi-200	in ESXi-200	in ESXi-200
Time	Sync NTP							

Table 2.2: Specifications of Proposed New Architecture

Administration

Administrators username, privileges/rights	Singapore Data Centre	Maldives Data Centre	Frankfurt Data Centre	Frankfurt Backup Data Centre
Domain	crme.local	crme.local	crme.local	crme.local
First Name	Mary	Peter	Eddie	Eddie
Last Name	Jane	Parker	Brock	Brock
Username	MaryJane	PeterParker	EddieBrock	EddieBrock
Password	Pa$$w0rd1234	Pa$$w0rd1234	Pa$$w0rd1234	Pa$$w0rd1234
Email address	mary@crme.local.com	peter@crme.local.com	eddie@crme.local.com	eddie@crme.local.com
Role	Administrator	Administrator	Administrator	Administrator
Group	@ Administrator	@ Administrator	@ Administrator	@ Administrator
Permissions	Object & children	Object & children	Object & children	Object & children

Table 2.3: Administration: username, privileges/rights

User Username, privileges/rights	Singapore Data Centre	Maldives Data Centre	Frankfurt Data Centre	Frankfurt Backup Data Centre
Domain	crme.local	crme.local	crme.local	crme.local
First Name	User	User	User	User
Last Name	One	Two	Three	Three
Username	UserOne	UserTwo	UserThree	UserThree
Password	Pa$$w0rd2022	Pa$$w0rd2022	Pa$$w0rd2022	Pa$$w0rd2022
Email address	UserOne@crme.local.com	UserTwo@crme.local.com	UserThree@crme.local.com	UserThree@crme.local.com
Role	User	User	User	User
Group	@ Users	@ Users	@ Users	@ Users

Table 2.4: User: username, privileges/rights

Backup and Recovery Procedure, Monitoring Event and Alert Management

Backup & Recovery Procedure

- **Objective:**
  - Moving virtual machines to off-site servers
- **Backup:**
  - offline migration and live migration
- **Storage:**
  - Live storage migration

Power on ESXi-220: 192.168.138.220

- Add both **ESXi-200 (main)** and **ESXi-220 (backup)** to the Datecenter.

**** Follow lab 15**

Alert Management

Configure **alert Type**, **alert trigger**, and **condition**

Field/Setting	Value
Alarm name	**VM CPU Usage**
Alarm Type: **Monitor**	Select **Virtual Machines** and select **Monitor for > specific conditions or state**, for example, **CPU usage**, **power state**.
Enable this alarm	Leave selected

Go to **Triggers** Tab > **Add** > configure the following

Trigger Setting	Value
Trigger Type	Select **VM CPU Usage**
Condition	Select is **Above**
Warning Condition	**60%** for **2 Mins**
Critical Condition	**70%** for **5 Mins**
Trigger	**ANY**
	Next to continue

@ **Actions** Tab > **Add** > configure the following

Action Setting	Value
Action	Click Action header > **Suspend VM** from the list.
Configuration	Leave it as it is.
Green to Yellow	Select **Once** from the list.
Yellow to Red	Change **from Once to no value.**
Red to Yellow	Leave blank.
Yellow to Green	Leave blank.

Click on the chosen VM > Manage > Alarm Definition

Monitoring Event

Click on the chosen VM > select Alarms > New Alarm Definition

Field/Setting	Value
Alarm name	**VM Suspended**
Alarm Type: **Monitor**	Select **Virtual Machines** and select **Monitor for > specific events occurring on this object**, for example, **VM Powered On**.
Enable this alarm	Leave selected

Click **Next** and **Add**

Click on **Trigger** @ Event Col >

Trigger Setting	Value
Event	Select VM Suspended

Click on the chosen VM > Manage > Alarm Definition

- **Add**
- @ Argument Col > **Change Tag** > Select chosen VM name
- @ Operator Col > leave "**equal**" to selected
- @ Value Col > Type the selected VM name
  - Note the VM name is **CASE SENSITIVE**
- Click **Next** > **Finish**

Verify the created alarm appears on the list.

Table 3: Backup and Recovery Procedure, Monitoring Event and Alert Management

Why Consider Virtual Infrastructure

As you can see, both physical servers and virtual machines provide users with multiple benefits. Therefore, when choosing between the two, it is important to consider their distinctive characteristics to find out how they can be applied to your organization's infrastructure. The main differences between physical servers and VMs are outlined in the table below.

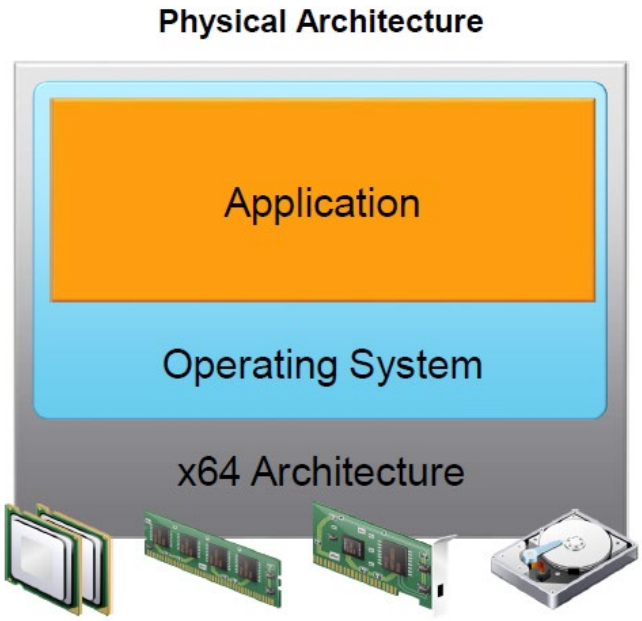
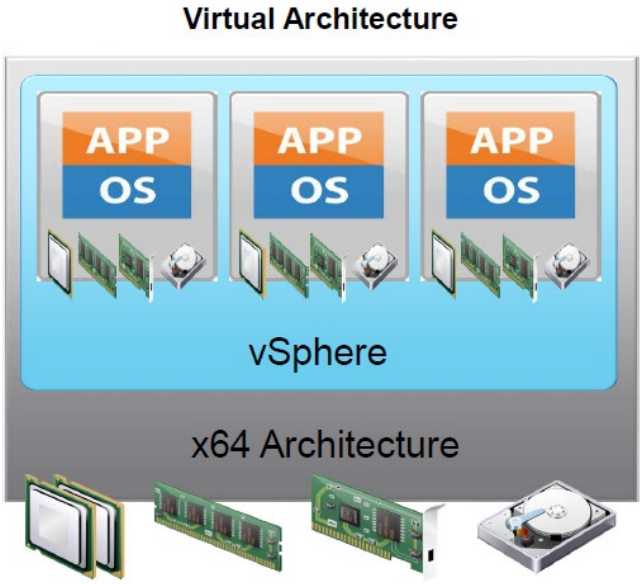
Physical Servers	Virtual Machines
Large upfront costs Difficult to relocate: • Moves require downtime. • Specific to physical hardware.	**Easy to relocate:** • Encapsulated into files. • Independent of physical hardware.
Difficult to manage: • Require physical maintenance. • Hardware failures cause downtime.	**Easy to manage:** • Isolated from other virtual machines. • Insulated from hardware changes.
Hardware has limitations: • Hardware changes limit application support. • One-to-one relationship between application and server.	**Provide the ability to support legacy applications.** **Enable servers to be consolidated.**
	

Table 4: Study on advantages and disadvantages.

Titbit information for vCenter Server Appliance (VCSA)

1) Do not need a windows license.
2) Do not need an SQL license.
3) Easy to deploy and easy to upgrade (built-in update function).

Resources required

Virtualization Cost Calculation

Items	Brand / Details	Quantity	USD	Per Price	USD	Total Amount of Ownership
OS	Windows 7 Enterprise volume license	200	$	25	$	5,000
OS	Debian Linux 9	Open source	$	NIL	$	NIL
Firewall	Watchguard FireboxV Medium + 3 Yr Standard Support	3	$	3,285	$	9,855
Server	PowerEdge R650xs Rack Server	3	$	7,363.64	$	22,090.92
VMware	VMware Workstation 16 Pro + 1 Yr Production Support	1	$	249	$	249
VMware	VMware vSphere Enterprise Plus	1	$	4,350	$	4,350
VMware	VMware vCenter Server Standard + 3 Yr Support	1	$	10,251.16	$	10,251.16
Support	Professional Service & Deployment	1 Year	$	17,000	$	17,000
Server Rack	TOTEN Professional 42U Server Rack	2	$	1234.59	$	2,469.18
NAS	Synology FlashStation FS6400	1	$	12,065.59	$	12,065.59
					$	**83,330.85 /-**

Table 5: Virtualization cost calculation

Link: https://www.theverge.com/2020/1/22/21076653/microsoft-windows-7-extended-security-updates-german-government-cost-price

Support: Professional Service & Deployment

	Scope	Prepare	Enable	Deploy
Project Management	✓	✓	✓	✓
Project Engineering	✓	✓	✓	✓
Getting started with VM Hypervisor	✓	✓	✓	
Configuration Services	✓	✓	✓	
Deployment services			✓	✓

Table 5.1: Support: Professional Service & Deployment

vCenter Server Appliance (VCSA) Deployment Scalability Options

Size	vCPU	vRAM (GB)	Hosts (Max)	VMs (Max)
Tiny	**2** ✓	**10** ✓	**10** ✓	**100** ✓
Small	4	16	150	3000
Medium	8	24	300	6000
Large	16	32	1000	10 000

Table 5.2: vCenter Server Appliance (VCSA) Deployment Scalability Options

Spare page

Spare page

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