CS311 – Assignment 2

Title: Virtualization Software Implementation and Configuration
Author: *Vishant Chand*
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1. Introduction

This assignment demonstrates the use of **Oracle VirtualBox** to deploy and manage multiple virtual machines (VMs) for different operating systems.
Key objectives were:

- Install and configure Android, Windows Server 2022, and Windows 10/11 virtual machines.
- Explore virtualization features such as RAID, BitLocker, disk partitioning, and virtual memory.
- Test performance, security, and data redundancy techniques.

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2. Tools and Environment

Item	Details
Virtualization Platform	Oracle VirtualBox (version X.X)
Host OS	*Your host OS*
Guest OS 1	Android (32/64-bit)
Guest OS 2	Windows Server 2022 (Desktop Experience)
Guest OS 3	Windows 10/11
Hardware Specifications	*CPU cores, RAM, storage, etc.*

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3. Procedure and Implementation

3.1 Part 1 – Android Virtual Machine (VM01)

1. **VM Creation**

o Configured Android OS (32/64-bit) with allocated RAM, CPU, graphics, and network settings.
o Enabled Internet access using a bridged adapter.
2. **Device Care Exploration**
   o Demonstrated battery, storage, memory, performance management, and security settings.
   o *[Insert screenshots]*
3. **App Performance Test**
   o Installed *Candy Crush*.
   o Measured CPU and memory impact using VirtualBox resource monitor.
   o Applied optimization strategies (e.g., limiting background processes).

3.2 Part 2 – Windows Server 2022 (VM02)

1. **Installation & Partitioning**
   o Installed Windows Server 2022 (Desktop Experience).
   o Partitioned a 256 GB disk into two 128 GB volumes (extra reserved partitions created automatically).
2. **Network & Domain Configuration**
   o Host-only/internal adapter.
   o Domain: `Sxxxxxxx.com` (Group Leader ID).
   o IP configuration:
   o `IP Address: 192.168.X.X`
   o `Subnet Mask: 255.255.255.0`
   o `Default Gateway: 192.168.X.X`
   o `Preferred DNS: 192.168.X.X`
3. **System Enhancements**
   o Extended disk partition by an additional 64 GB.
   o Configured 2 GB of virtual memory for paging.
4. **Storage Pool & RAID**
   o Implemented a storage pool with *chosen RAID level* (e.g., RAID 1).
   o **Benefits:**
     ▪ RAID 1 provides data mirroring for redundancy and improved read performance.
5. **Security – BitLocker**
   o Enabled BitLocker encryption on the server drive.
   o Saved and tested the recovery key by unlocking the encrypted drive.

3.3 Part 3 – Client OS (VM03)

1. **Client Installation & Domain Join**
   o Installed Windows 10/11 and joined it to the Server domain.
   o Verified login with domain credentials.

2. **Storage Pool Mapping**
   - o Mapped the RAID storage pool to the client OS for secure data storage.
3. **RAID Failure Simulation**
   - o Simulated a disk failure.
   - o Verified successful data integrity and automatic recovery from the RAID setup.
4. **Evaluation of Key Technologies**
   - o **RAID:** Improved fault tolerance and read performance.
   - o **Storage Pools:** Flexible management of storage capacity.
   - o **BitLocker:** Strong encryption for data security.
   - o **Virtual Memory:** Enhanced system performance by using disk space as memory.
   - o **Disk Partitioning:** Efficient space management and isolation of system data.

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4. Observations & Results

- All VMs operated smoothly within VirtualBox.
- RAID configuration successfully protected data during simulated disk failure.
- BitLocker encryption and recovery key functioned as expected.
- Android performance impact from app installation was measurable but manageable.

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5. Challenges and Solutions

Challenge	Solution
Network adapter not detected initially	Adjusted VirtualBox network settings to bridged/host-only mode
RAID configuration errors	Reviewed storage pool setup and recreated volumes
High CPU usage during multi-VM operation	Increased host RAM and adjusted VM resource allocation

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6. Conclusion

The assignment demonstrated practical skills in virtualization, including OS installation, network configuration, security implementation, and performance optimization.
The successful setup of Android, Windows Server 2022, and Windows 10/11 VMs highlights the versatility of Oracle VirtualBox in enterprise and development environments.