Configuration Manual

MSc Research Project
MSc Cloud Computing

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Configuration Manual

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1 Introduction

This document provides a detailed and comprehensive configuration manual for the cloud infrastructure implemented as part of the research project, "Cloud-Based Disaster Recovery and Business Continuity." It serves as a technical blueprint, detailing the specific parameters, commands, and resource identifiers used to construct the experimental environment on the Amazon Web Services (AWS) platform.

The purpose of this manual is to provide a transparent, reproducible, and verifiable account of the system that was built. All configurations were performed within the following scope:

- **AWS Account ID:** 460351657374
- **Primary AWS Region:** eu-north-1 (Stockholm)

This manual follows the chronological order of implementation, from the foundational networking to the final automation setup, providing the as-built specifications for the system that was subsequently used for all manual and automated disaster recovery tests discussed in the main research report.

2 Aws Infrastructure Provisioning

This section details the manual setup of the core AWS infrastructure components via the AWS Management Console.

2.1 Networking Configuration (VPC, Subnet, Gateway, Routing)

A logically isolated network was established to host the application environment.

Component	Setting	Value	Resulting ID
VPC	Name	cbdr-vpc	vpc-02455c7af67e01440
	CIDR Block	10.0.0.0/24	
Subnet	Name	cbdr-subnet	subnet-0f45ed171ea54d876
	VPC	cbdr-vpc	
	CIDR Block	10.0.0.0/28	
Internet Gateway	Name	cbdr-gateway	igw-0d22ee75dca5828b5
	Attachment	Attached to cbdr-vpc	
Route Table	Name	cbdr-route-table	rtb-00d3cc0315bb46ffb
	Subnet Association	cbdr-subnet	
	Route Rule	Destination: 0.0.0.0/0, Target: igw-0d22ee75dca5828b5	

2.2 Security and Access Configuration (Key Pair & Security Group)

Security mechanisms were configured to control access to the compute resources.

- **Key Pair Configuration:**
  - **Name:** cbdr-key-pair

- o **Type:** RSA
- o **Format:** PEM
- o **Resulting ID:** key-041a95b08a16f59ab
- o **Local Permissions (Windows):**

icacls "E:\arbaz_thesis\cbdr-key-pair.pem" /inheritance:r
icacls "E:\arbaz_thesis\cbdr-key-pair.pem" /grant:r "%username%":(r)
- • **Security Group Configuration:**
  - o **Name:** launch-wizard-1 (Auto-generated)
  - o **Resulting ID:** sg-0f8bf19fba75ece95
  - o **Inbound Rules:**
    - ▪ Type: SSH, Protocol: TCP, Port: 22, Source: 0.0.0.0/0
    - ▪ Type: HTTP, Protocol: TCP, Port: 80, Source: 0.0.0.0/0

2.3   Compute Resource Configuration (EC2 Instance)

The primary web server was provisioned as follows:

Setting	Value
Name	cbdr-webserver
Resulting ID	i-0aa873fa46cc5c701
AMI	Amazon Linux 2023 AMI (ami-00c8ac9147e19828e)
Instance Type	t3.micro
Key Pair	cbdr-key-pair
VPC / Subnet	cbdr-vpc / cbdr-subnet
Public IP	16.170.247.148 (Enabled auto-assignment)
Availability Zone	eu-north-1b

3   Application and Data Layer Configuration

This section describes the configuration performed within the EC2 instance's operating system.

3.1   Web Server Installation and Setup

The instance was configured as a web server with the following commands executed via SSH:

```
# Update the system and install the Apache web server
sudo yum update -y
sudo yum install httpd -y

# Start and enable the web server to run on boot
sudo systemctl start httpd
sudo systemctl enable httpd

# Create a sample web page for testing
echo "<h1>My Static Website for Disaster Recovery Thesis</h1>" | sudo tee
/var/www/html/index.html
```

Service availability was verified by accessing http://16.170.247.148/ in a web browser.

3.2   Data Volume Preparation and Mounting

A dedicated EBS volume was created for critical data.
- • **Initial Volume Creation:**
  - o **Type:** gp3
  - o **Size:** 1 GiB
  - o **Availability Zone:** eu-north-1b
  - o **Resulting ID:** vol-039ff35f1ee070d41

- **Attachment & Formatting Commands (executed on EC2 instance):**

```
# Verify device attachment (appeared as nvme1n1)
lsblk

# Create an XFS filesystem on the new volume
sudo mkfs -t xfs /dev/nvme1n1

# Create a mount point and mount the volume
sudo mkdir /data
sudo mount /dev/nvme1n1 /data
```

- **Configuration for Automatic Mounting:**
1. The volume's unique identifier was retrieved:

```
sudo blkid /dev/nvme1n1
# Output: /dev/nvme1n1: UUID="d72c7e7b-327c-4fb0-881d-b59aa467c8b3" ...
```

2. The following line was added to /etc/fstab to ensure the volume mounts on reboot:

```
UUID=d72c7e7b-327c-4fb0-881d-b59aa467c8b3   /data  xfs  defaults,nofail  0  0
```

3. A test file was created to simulate critical data:

```
echo "Disaster Recovery Test File" | sudo tee /data/testfile.txt
```

4   Data Protection and Backup Strategy

A centralized, policy-driven backup strategy was implemented using AWS Backup.

4.1 AWS Backup Vault Configuration

- **Name:** cbdr-backup-vault
- **Encryption:** Default AWS Backup Key
- **Resulting   ARN:** arn:aws:backup:eu-north-1:460351657374:backup-vault:cbdr-backup-vault

4.2 AWS Backup Plan Configuration

- **Name:** cbdr-backup-plan
- **Rule Name:** cbdr-backup-rule
- **Target Vault:** cbdr-backup-vault
- **Frequency:** Daily
- **Retention:** 7 Days
- **Cross-Region Copy:** Enabled, to eu-west-1 (Ireland)
- **Resource Assignment:** The plan was assigned to protect the specific EBS volume vol-039ff35f1ee070d41.

5   Automation and Orchestration Configuration

This section details the setup for the automated recovery script.

5.1 IAM User for Automation

An IAM user was created to provide programmatic permissions to the automation script.
- **User Name:** cbdr-automation-user
- **Access Type:** Programmatic Access (Access Key & Secret Key)
- **Attached Policies:**
  - AmazonEC2FullAccess
  - AWSBackupFullAccess
  - AmazonS3ReadOnlyAccess
  - IAMReadOnlyAccess
  - CloudWatchLogsFullAccess

5.2   Local Environment and Script Execution

- **AWS CLI Configuration:** The generated credentials for cbdr-automation-user were configured on the local machine using aws configure.
- **Python Environment:** A virtual environment was created and the Boto3 library was installed (pip install boto3).
- **Script Execution:** The automated recovery was initiated by running the cbdr_recovery.py script.

6   Conclusion

This manual has detailed the precise configuration of the AWS environment used for this research. The successfully provisioned system includes isolated networking, a secured and functional web server, a dedicated data volume, and a comprehensive, policy-driven backup strategy. Furthermore, programmatic access for automation has been established through a least-privilege IAM user.

This "as-built" system represents the stable and fully documented baseline upon which all disaster recovery experiments were performed. The configurations herein provide the necessary context for understanding the outcomes, challenges, and findings discussed in the evaluation section of the main research report.