

Configuration Manual

MSc Research Project Cloud Computing

Hamza Niaz Student ID: 23251298

School of Computing National College of Ireland

Supervisor: Shreyas Setlur Arun





MSc Project Submission Sheet

	School of Compu	ting	
	Hamza Niaz		
Student Name:			
	23251298		
Student ID:			
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	Shreyas Setlur Arun		
Lecturer:			
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Configuration Manual

Hamza Niaz 23251298

1. Hardware Resources for the Experiment are listed below:

> Okay, let's get started withAWS EC2 (Elastic Compute Cloud) Instance

- Instance Type: t2.large
- vCPU: 2 vCPUs
- RAM: 8 GiB
- Storage: Elastic Block Store (EBS) volume with dynamic allocation based on demand.
- Network: Virtual Private Cloud (VPC) architecture with customized subnets for improved security
- Purpose: To host Hyperledger Fabric nodes.

≻ Local system:

- Processor: Like ex. Intel i5
- RAM: suggest 16 gb
- Storage: 500+ gb
- Disk Operating System: Ubuntu 20.04 for Docker or Go and Node. Js.

≻ Networking:

- Bandwidth: Min 10 Mbps
- Security: Security groups that are set up to allow specified ports (7050 for Hyperledger Fabric, 22 for SSH, 443 for HTTPS).

➢ Backup Storage:

- Blockchain data logs and backups AWS S3
- S3 CLASS FOR GENERAL PURPOSE STORAGE.

2. Software Resources for the Experiment are listed below:

> Operating Systems:

- Ubuntu 20.04:
- The Base OS for AWS EC2 instances and local development
- Chosen for compatibility with Blockchain tools such as Docker and Hyperledger Fabric.

Blockchain Framework:

- Hyperledger Fabric:
- Version : Hyperledger Fabric v2 x

- Features: (custom consensus mechanisms via modularity, smart contract support (Go-written chaincode))
- Programming Languages:
- Go:
- Version: 1.16 or above.
- Writing chaincode (smart contracts)Purpose
 Node.js:
- Version: 14.x LTS or above.
- Purpose: Building the web front end and client-side applications.
- Development Tools:
 - Docker:
 - Version: 20.x or above.
 - Abstract: This model was made to containerize Hyperledger Fabric nodes so they may be deployed more easily.
 - Git:
 - It is a Version Control System for managing source code.
- > AWS Services:
- EC2
- IAM
- Amazon Managed Blockchain □ AWS S3:
- Use: Logs and transaction backups storage
 AWS CloudWatch:
- Why: To monitor and log performance.
- AWS CloudTrail:
- Use Case: Auditing and monitoring API calls for security/compliance.

Security Tools:

- SSL/TLS: To encrypt data in motion
- AWS Key Management Service (KMS): Data encryption at rest [] IAM (Identity and Access Management): To impose strict access policies.
- ➤ Additional Software:
- Hyperledger Fabric CA: Identity Management Certificate authority.
- cURL: For API testing.
- Postman: For working with APIs.

3. Procedure for the Experiment:

First Set up the AWS account for my experiment

- □ Create an AWS account
- > Now Install the required tools on my local system
- Now set up the AWS Services

□ Now Lanch the EC2 Instance and Navigate the EC2 Dashboard in Aws Console. The instance we select is t2.large and choose the operating system Ubuntu 20.04. Now we set the security group and allow ports 22(SSH), (Hyperledger Fabric)7050 and (HTTPS)443. The below image shows available and launch new instances. We use this for handle blockchain transations.

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Figure 1: EC2 Dashboard

Now we give the EC2 connection which is shown in the figure.





Figure 2: EC2 Connection

- Now we set up blockchain on AWS
 - We use the Amazon Managed Blockchain service of the AWS where we can create the blockchain network and this service offer a popular frameworks that is Hyperledger Fabric and Ethereum and we have the freedom to choose the framework so we use hyperledger fabric for our experiment.
- ▶ Now we set up the EC2 instance for blockchain node
 - First we create an EC2 instance for the blockchain node which is the heart of a given blockchain network. The below figure show the summary of the EC2 instance for processing transactions on the blockchain network in the blockchain node.

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Figure 3: EC2 Instance Summary

• We use the Hyperledger Fabric framework and create a private blockchain network for secure financial transactions.

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Figure 4: Blockchain Network Creation

Now we set up AWS S3 and create S3 bucket and configured it which is shown in the below figure.



Figure 5: S3 Bucket for Backup

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Figure 1: Storage and EBS Monitoring

- ➢ Now we set up the security group configuration
 - We use the AWS IAM which is a popular aspect of secure services that addresses permissions and access to blockchain nodes and users and it allows admin to give more than one roles and policies for engage with the blockchain network.

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Figure 7: Secure Group Configuration

• We set the IAM role which make the secure access to AWS resources Like EC2 and S3 in the blockchain node.

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Figure 8: IAM Role for Permissions

➢ Now we set the AWS cloudwatch for monitoring

□ It has a function of monitor the health and function of blockchain network and it works with collecting and monitoring logs and metrics that is coming from different AWS resources like the EC2 instances and S3 buckets that gives real time views and information on how the system works.



Figure 9: CloudWatch Monitor



Figure 10: Log Stream for Blockchain Transactions

Now we make the Transaction which is shown in the below figures



Figure 11: app.js



Figure 12: app.js

Now the transaction we make saved successfully to S3 which is shown in the below figure



Figure 13: Transaction Saved to S3

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