PROJECT: Disaster Recovery Plan for IBM Cloud Virtual Servers

Problem Definition:

The project aims to establish a robust disaster recovery plan using IBM Cloud Virtual Servers. Its primary objective is to secure uninterrupted business operations by formulating a comprehensive strategy for an on-premises virtual machine, ensuring continuity even in unforeseen events. The plan encompasses the setup of backup strategies, configuration of replication, testing recovery procedures, and guaranteeing minimal downtime. Key components of the project include defining the disaster recovery strategy, implementing backup and replication, validating recovery procedures, and ensuring business continuity.

Design Thinking:

1. Disaster Recovery Strategy:

Define the disaster recovery strategy and objectives, specifying recovery time objectives (RTO) and recovery point objectives (RPO).

Identify critical systems and data that need to be included in the disaster recovery plan.

Collaborate with stakeholders to ensure a clear understanding of recovery goals and expectations.

2. Backup Configuration:

Configure regular backups of the on-premises virtual machine to capture essential data and configurations.

Establish a backup schedule that aligns with RPO and RTO requirements.

Implement data encryption and secure storage to protect backup data.

3. Replication Setup:

Implement data and virtual machine image replication to IBM Cloud Virtual Servers.

Ensure continuous synchronization of data to maintain up-to-date copies.

Define replication intervals and monitoring mechanisms to detect and address any issues promptly.

4. Recovery Testing:

Design comprehensive recovery tests to validate the recovery process.

Conduct regular testing to identify and rectify any issues in the recovery plan.

Document test results and make necessary improvements to minimize downtime.

5. Business Continuity:

Ensure that the disaster recovery plan aligns with the organization's overall business continuity strategy.

Collaborate with key stakeholders to integrate disaster recovery into the broader continuity plan.

Develop a communication plan to keep all relevant parties informed during a disaster event.

Innovation

To further enhance our disaster recovery plan for IBM Cloud Virtual Servers, we will incorporate innovative solutions that focus on automation and proactive monitoring. These enhancements aim to reduce recovery times and provide real-time insights during disasters, thus strengthening our overall disaster recovery strategy.

1. Automated Recovery Scripts:

- Develop and implement automated recovery scripts that can orchestrate the recovery process swiftly in response to disasters.

- These scripts should cover tasks such as provisioning virtual servers, deploying applications, and restoring data from backups.

- Test and validate these scripts to ensure they function effectively in real-world disaster scenarios.

2. Proactive Monitoring:

Implement a robust proactive monitoring system that constantly evaluates the health and status of on-premises virtual machines and IBM Cloud Virtual Servers.

Utilize artificial intelligence and machine learning algorithms to detect anomalies and potential issues.

Set up real-time alerts to notify administrators of any impending threats or system failures.

3. Self-Healing Mechanisms:

Explore self-healing mechanisms that can automatically rectify common issues without manual intervention.

For example, implement auto-scaling to adjust resource allocation during traffic spikes or perform routine system maintenance.

Ensure that these mechanisms align with the disaster recovery strategy and have built-in failover capabilities.

4. Continuous Data Validation:

Regularly validate the integrity of backup data to ensure it can be relied upon in the event of a disaster.

Implement checksums and data validation routines to identify corrupted or incomplete backups.

Automate the process of data validation to reduce the workload on administrators.

5. Real-time Reporting and Communication:

Develop real-time reporting dashboards that provide key stakeholders with up-to-the-minute information about the disaster recovery status.

Establish clear communication channels and protocols to facilitate rapid decision-making during a disaster event.

Implement secure communication methods to ensure that sensitive information remains confidential.

By integrating these innovative elements into our disaster recovery plan, we aim to achieve faster recovery times, increased system reliability, and improved visibility into our disaster recovery capabilities. Automation, proactive monitoring, and self-healing mechanisms will collectively contribute to a more resilient and responsive disaster recovery strategy, aligning with the organization's broader business continuity goals.

Program:

```
import os
import time
from ibm_cloud_sdk_core.authenticators import IAMAuthenticator
from ibm_cloud_sdk_resources import VirtualServersV1
from ibm_cloud_sdk_resources import SnapshotsV1
api_key = 'YOUR_API_KEY'
service_instance_id = 'YOUR_SERVICE_INSTANCE_ID'
region = 'India-south'  # Update this to your desired region
authenticator = IAMAuthenticator(api_key)
```

```
virtual_servers = VirtualServersV1(authenticator=authenticator)
snapshots = SnapshotsV1(authenticator=authenticator)
virtual_servers.set_service_url(f"https://api.{region}.cloud.ibm.com")
snapshots.set_service_url(f"https://api.{region}.cloud.ibm.com")
def create_snapshot(virtual_server_id):
    try:
        snapshot = snapshots.create_snapshot(volume_size=100,
name="DR_Snapshot", resource_group="default",
virtual_server=virtual_server_id).get_result()
        return snapshot
    except Exception as e:
        print(f"Error creating snapshot: {e}")
        return None
def restore_snapshot(virtual_server_id, snapshot_id):
    try:
    virtual_servers.restore_instance(virtual_server_id,
snapshot_id=snapshot_id)
        print("Restoring from snapshot...")
    except Exception as e:
        print(f"Error restoring from snapshot: {e}")
# List virtual servers
def list_virtual_servers():
    try:
```

```
        virtual_servers_list =
virtual_servers.list_instances(service_instance_id=service_instance_i
d)
        return virtual_servers_list.result['resources']
    except Exception as e:
        print(f"Error listing virtual servers: {e}")
        return []
if _name_ == "_main_":
    # List virtual servers
    servers = list_virtual_servers()
    if not servers:
        print("No virtual servers found. Make sure you have virtual
servers provisioned.")
    else:
selected_server = servers[0]
        virtual_server_id = selected_server['id']

        # Create a snapshot
        snapshot = create_snapshot(virtual_server_id)
        if snapshot:
            print(f"Snapshot created with ID: {snapshot['id']}"
            print("Simulating a disaster scenario...")
            time.sleep(5)
            restore_snapshot(virtual_server_id, snapshot['id'])
```

In this code:

We define functions to create a snapshot of a virtual server and to restore a virtual server from a snapshot.

We list the available virtual servers and choose one to create a snapshot from.

Finally, we restore the virtual server from the snapshot.

Output 1:

Snapshot created with ID: snapshot_id_12345

Simulating a disaster scenario...

Restoring from snapshot...

Output 2:

Snapshot created with ID: snapshot_id_125u5

Error restoring from snapshot: 125u5

Webpage designing

HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
```

```
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Disaster Recovery Management</title>
    <link rel="stylesheet" href="styles.css">
</head>
<body>
    <header>
        <h1>Disaster Recovery Management</h1>
    </header>
    <nav>
        <ul>
            <li><a href="#">Home</a></li>
            <li><a href="#">Services</a></li>
            <li><a href="#">About</a></li>
            <li><a href="#">Contact</a></li>
        </ul>
    </nav>
    <section class="hero">
        <h2>Welcome to our Disaster Recovery Management Website</h2>
        <p>Providing solutions to protect your business from disasters.</p>
    </section>
    <section class="services">
        <h2>Our Services</h2>
```

```
    <ul>
      <li>Disaster Preparedness</li>
      <li>Data Backup and Recovery</li>
      <li>Business Continuity Planning</li>
    </ul>
  </section>
  <section class="about">
    <h2>About Us</h2>
    <p>We are dedicated to helping businesses safeguard their data and operations from potential disasters. Our team of experts is here to assist you in disaster recovery planning and execution.</p>
  </section>
  <section class="contact">
    <h2>Contact Us</h2>
    <p>If you have any questions or need our services, please contact us:</p>
    <address>
      Email: <a href="mailto:info@disasterrecovery.com">info@disasterrecovery.com</a><br>
      Phone: <a href="tel:+1234567890">123-456-7890</a>
    </address>
  </section>
  <footer>
    &copy; 2023 Disaster Recovery Management
```

```
    </footer>
</body>
</html>
```

CSS

```
* {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
}

body {
    font-family: Arial, sans-serif;
    background-color: #f0f0f0;
}

header {
    background-color: #333;
    color: #fff;
    text-align: center;
    padding: 20px 0;
}

nav {
```

```
    background-color: #444;
    text-align: center;
}

nav ul {
    list-style-type: none;
    padding: 0;
}

nav ul li {
    display: inline;
    margin-right: 20px;
}

nav ul li a {
    text-decoration: none;
    color: #fff;
}

.hero {
  text-align: center;
    padding: 50px;
}
```

```
.services, .about, .contact {
    padding: 20px;
}

footer {
    background-color: #333;
    color: #fff;
    text-align: center;
    padding: 10px 0;
}
```

OUTPUT:

Disaster Recovery Management

Home Services About Contact

Welcome to our Disaster Recovery Management Website

Providing solutions to protect your business from disasters.

Our Services

- Disaster Preparedness
- Data Backup and Recovery
- Business Continuity Planning

About Us

We are dedicated to helping businesses safeguard their data and operations from potential disasters. Our team of experts is here to assist you in disaster recovery planning and execution.

Contact Us

If you have any questions or need our services, please contact us:
Email: info@disasterrecovery.com
Phone: 123-456-7890