**Automating Database Backups and Restores with RDS**

***A Summer Internship Report submitted in partial fulfillment of the***

***requirements for the award of degree of***

**BACHELOR OF TECHNOLOGY**

**In**

**COMPUTER SCIENCE and ENGINEERING**

## Submitted by:

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**Department of Computer Science and Engineering**

**ADITYA ENGINEERING COLLEGE (A)**

**Approved by AICTE, Permanently affiliated to JNTUK & Accredited by NAAC with ‘A++’ Grade**

**Recognized by UGC under the sections 2(f) and 12(B) of the UGC act 1956**

**Aditya Nagar, ADB Road –Surampalem 533437, Kakinada Dist., A.P.,**

**2024-2025.**

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**Department of Computer Science and Engineering**

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**CERTIFICATE**

This is to certify that the Internship report entitled *“***Automating Database Backups and Restores with RDS***”* is being submitted by

**TADI SURENDRA REDDY (22A91A0597)**

In partial fulfillment of the requirements for award of the B.Tech., degree in Computer Science and Engineering for the academic year 2024-2025.

**Internship Coordinator Head of the Department**

Guide Name, Qualification Dr. K. Swaroopa, M. Tech., Ph.D.,

Designation Associate Professor

Department of CSE Department of CSE

**DECLARATION**

We hereby declare that the project entitled **“Automating Database Backups and Restores with RDS”** is a genuine project. This work has been submitted to the **ADITYA ENGINEERING COLLEGE,** Surampalem, permanently affiliated to **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA** in partial fulfillment of the **B.Tech.,** degree**.** We further declare that this project work has not been submitted in full or part of the award of any degree of this or any other educational institutions.

**by**

**TADI SURENDRA REDDY (22A91A0597)**

**Internship Completion Certificate**



**ACKNOWLEDGEMENT**

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# Abstract

**Learning Objectives/Internship Objectives**

* Internships are generally thought of to be reserved for college students looking to gain experience in a particular field. However, a wide array of people can benefit from Training Internships in order to receive real world experience and develop their skills.
* An objective for this position should emphasize the skills you already possess in the area and your interest in learning more
* Internships are utilized in a number of different career fields, including architecture, engineering, healthcare, economics, advertising and many more.
* Some internships are used to allow individuals to perform scientific research while others are specifically designed to allow people to gain first-hand experience working.
* Utilizing internships is a great way to build your resume and develop skills that can be emphasized in your resume for future jobs. When you are applying for a Training Internship, make sure to highlight any special skills or talents that can make you stand apart from the rest of the applicants so that you have an improved chance of landing the position.

# WEEKLY OVERVIEW OF INTERNSHIP ACTIVITIES

|  |  |  |  |
| --- | --- | --- | --- |
| **1st WEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 03-06-2024 | Monday | On-boarding and introduction to company |
| 04-06-2024 | Tuesday | Holiday |
| 05-06-2024 | Wednesday | Introduction to GitHub and Version Control System |
| 06-06-2024 | Thursday | Introduction to Operating Systems |
| 07-06-2024 | Friday | Working with Different Operating Systems |
| 08-06-2024 | Saturday | Introduction to Client-Server Architecture |

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| --- | --- | --- | --- |
| **2nd WEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 10-06-2024 | Monday | Different types of Servers |
| 11-06-2024 | Tuesday | Introduction to Networking |
| 12-06-2024 | Wednesday | Datacenters and Servers |
| 13-06-2024 | Thursday | Activity on infrastructure connectivity |
| 14-06-2024 | Friday | Introduction to Cloud Infrastructure |
| 15-06-2024 | Saturday | Cloud Computing Models |

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| --- | --- | --- | --- |
| **3rd WEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 17-06-2024 | Monday | Holiday |
| 18-06-2024 | Tuesday | Cloud Services |
| 19-06-2024 | Wednesday | Introduction To Virtualization |
| 20-06-2024 | Thursday | Virtual Severs of Linux |
| 21-06-2024 | Friday | Activity on Cloud and Virtualization |
| 22-06-2024 | Saturday | Introduction to Linux OS |

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| --- | --- | --- | --- |
| **4thWEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 24-06-2024 | Monday | Linux command syntax and basic commands |
| 25-06-2024 | Tuesday | Linux User and Groups |
| 26-06-2024 | Wednesday | Basic file and directory permission in Linux |
| 27-06-2024 | Thursday | Activity on Linux Operating System |
| 28-06-2024 | Friday | Introduction to AWS Services and Service Categories |
| 29-06-2024 | Saturday | Understanding AWS Management Console |

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| --- | --- | --- | --- |
| **5thWEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 01-07-2024 | Monday | AWS Regions and Availability Zones |
| 02-07-2024 | Tuesday | Introduction to AWS Compute Services |
| 03-07-2024 | Wednesday | Working with EC2 Service |
| 04-07-2024 | Thursday | Activity on AWS Management Console and EC2 Service |
| 05-07-2024 | Friday | Web application deployment on Windows Server using |
| 06-07-2024 | Saturday | EC2Web application deployment on Linux Server using |

|  |  |  |  |
| --- | --- | --- | --- |
| **6thWEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 08-07-2024 | Monday | EC2Managing options for EC2 instance |
| 09-07-2024 | Tuesday | Ways of connecting to Linux EC2 instances using SSH. Sharing data between local and cloud EC2 instances |
| 10-07-2024 | Wednesday | Activity on web application deployment using EC2 compute service |
| 11-07-2024 | Thursday | Introduction to Storage technologies |
| 12-07-2024 | Friday | Block vs Object Storage services |
| 13-07-2024 | Saturday | Working with AWS S3 |

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| --- | --- | --- | --- |
| **7thWEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 15-07-2024 | Monday | Volumes and Snapshots using AWS Elastic Block Storage |
| 16-07-2024 | Tuesday | Working with EBS Snapshots |
| 17-07-2024 | Wednesday | Holiday |
| 18-07-2024 | Thursday | Introduction to AWS Virtual Private Cloud and its components |
| 19-07-2024 | Friday | IPv4 Addressing and Subnetting |
| 20-07-2024 | Saturday | Web deployment using AWS Elastic Beanstalk |

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| --- | --- | --- | --- |
| **8thWEEK** | **DATE** | **DAY** | **NAME OF THE TOPIC/MODULE COMPLETED** |
| 22-07-2024 | Monday | Working with AWS Cloud Shell, AWS CLI & AWS Cloud9 IDE |
| 23-07-2024 | Tuesday | Static website deployment in AWS S3 using Python for AWS SDK (boto3) |
| 24-07-2024 | Wednesday | Secure access to cloud resources using AWS Identity and Access Management |
| 25-07-2024 | Thursday | Working with AWS NoSQL services and AWS DynamoDB |
| 26-07-2024 | Friday | Project Deployement |
| 27-07-2024 | Saturday | Project Deployement |

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1. **INTRODUCTION**

# 2.EXECUTIVE SUMMARY

* The cloud computing and database management sector is pivotal in today's digital landscape, offering scalable, secure, and efficient data solutions. Aditya College of Engineering and Technology specializes in providing cutting-edge cloud services, including database management with Amazon RDS, enabling businesses to leverage reliable and automated database solutions.
* During the internship, I engaged in the following key activities:
* Configured and managed Amazon RDS instances, focusing on automated backup solutions.
* Developed and implemented scripts for automated database restore procedures.
* Set up and monitored backup processes using Amazon CloudWatch and SNS.
* Designed disaster recovery plans with automated failover processes.
* Applied security best practices, including data encryption and IAM policies.
* This internship provided a comprehensive understanding of automating database backups and restores, equipping me with the skills to contribute effectively to the field of cloud computing and database management.
* Configured and Managed Amazon RDS Instances
* One of the primary tasks during my internship was configuring and managing Amazon RDS instances. This involved setting up new RDS instances, configuring database parameters, and ensuring that the instances were optimized for performance and reliability. I focused particularly on automated backup solutions, configuring daily backups, and setting appropriate retention periods to ensure data availability and durability.
* Developed and Implemented Scripts for Automated Database Restore Procedures
* To enhance the efficiency of disaster recovery operations, I developed and implemented scripts for automated database restore procedures. Using AWS CLI and SDKs, I created scripts that could automatically restore RDS instances from both automated backups and manual snapshots. This automation significantly reduced the time required to recover from failures and ensured minimal disruption to business operations.
* Set Up and Monitored Backup Processes Using Amazon CloudWatch and SNS
* Ensuring the reliability of backup processes was another critical responsibility. I set up monitoring systems using Amazon CloudWatch to track the status of backup operations and configured Amazon SNS (Simple Notification Service) to send alerts in case of any issues. This proactive monitoring allowed for quick resolution of potential problems and ensured that backups were completed successfully.
* **Designed Disaster Recovery Plans with Automated Failover Processes:**
* In addition to backup management, I also designed comprehensive disaster recovery plans that included automated failover processes. By configuring Multi-AZ (Availability Zone) deployments and using RDS read replicas, I ensured that the database systems could automatically failover to a standby instance in the event of a primary instance failure. This setup provided high availability and minimized downtime, which is crucial for maintaining business continuity.
* **Applied Security Best Practices:**
* Security is a critical aspect of database management. Throughout my internship, I applied security best practices to ensure that the backup data was protected. This included configuring encryption at rest and in transit for RDS instances, setting up IAM (Identity and Access Management) roles and policies to control access to the backups, and regularly auditing security settings to ensure compliance with best practices.
* **Learning Outcomes:**
* This internship provided a wealth of knowledge and practical experience in automating database backups and restores with Amazon RDS. Some of the key learning outcomes include:
* In-depth Understanding of Amazon RDS: I gained a thorough understanding of Amazon RDS, its features, and best practices for managing RDS instances.
* Automation Skills: I developed strong skills in automating backup and restore processes using AWS CLI, SDKs, and scripting languages.
* Monitoring and Alerting: I learned how to set up effective monitoring and alerting systems using Amazon CloudWatch and SNS to ensure the reliability of backup operations.
* Disaster Recovery Planning: I acquired the ability to design and implement robust disaster recovery plans that include automated failover processes to ensure high availability.
* Security Best Practices: I understood and applied security best practices to protect backup data, including encryption and IAM configurations.

# 3. ABOUT THE COMPANY

National Small Industries Corporation (NSIC), is an ISO 9001:2015 certified Government of India Enterprise under Ministry of Micro, Small and Medium Enterprises (MSME). NSIC has been working to promote aid and foster the growth of micro, small and medium enterprises in the country. NSIC operates through countrywide network of offices and Technical Centers in the Country. In addition, NSIC has set up Training cum Incubation Centre managed by professional manpower.

**Mission**: “To promote and support Micro, Small & Medium Enterprises (MSMEs) Sector” by providing integrated support services encompassing Marketing, Technology, Finance and other services.

**Vision**: “To be a premier Organization fostering the growth of Micro, Small and Medium Enterprises (MSMEs) Sector”.

# 4. OPPORTUNITIES:

During these six months of the internship, I was given the opportunity to perform the following role:

## Intern:

* + Coordinating with the team members and team leads on a regular basis to keep a track of the activities like the meetings held and about the work to be done.
  + I learned about developing the applications using different tools.
  + For that I have referred the GitHub repositories related to gain the complete knowledge on that.
  + Then I have gathered the requirements.
  + They also provide us the opportunity to voluntarily interact in other projects as well.
  + They have given different tasks to develop different parts of the application.
  + Also, they have finally conducted some tests to certify with the completion of internship.

# 5. TRAINING

**This internship equipped me with a range of valuable skills:**

* Technical Skills:
  + Proficiency in configuring and managing Amazon RDS instances.
  + Expertise in automating database backup and restore procedures using AWS CLI
  + Ability to set up and monitor backup processes using Amazon CloudWatch
  + Knowledge of designing and implementing disaster recovery plans with automated failover processes.
  + Understanding and applying security best practices for database management.
* Professional Skills:
  + Enhanced problem-solving abilities by addressing real-world challenges in database management.
  + Improved time management skills through structured weekly work schedules.
  + Strengthened collaboration and communication skills by working closely with team members and mentors.
  + Developed a proactive approach to monitoring and securing cloud infrastructure.
* Soft Skills:
  + Adaptability in a dynamic and fast-paced working environment.
  + Critical thinking and analytical skills for optimizing database performance and reliability.
  + Attention to detail in configuring backups and monitoring processes to ensure data integrity.

Overall, this internship provided a comprehensive understanding of automating database backups and restores with Amazon RDS. The skills and experiences gained during this period have prepared me to contribute effectively to the field of cloud computing and database management.

**6. CHALLENGES FACED**

* + At the beginning of the project, I struggled with understanding RDS backup and restore configurations.
  + I encountered challenges in writing and debugging automation scripts.
  + Managing costs associated with automated backups and mitigating performance impacts proved difficult.
  + Ensuring data consistency and security during backups and restores was a significant hurdle.
  + Integrating the backup system with other tools and systems presented its own set of difficulties.
  + Despite these challenges, I successfully completed the project and achieved my goals.