ReArchitecture –
ADWS Events Migration

By

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AT

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A Practice School II Station of

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

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BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI

Practice School Division

ABSTRACT SHEET

Station: Amazon Development Center   **Centre:** Gurugram

Duration: 19 weeks   **Date of Start:** 22 July, 2023

Date of Submission: 10 December, 2023

Title of the Project: ReArchitecture – ADWS Events Migration

ID No./ Name/
Discipline of the Student: 2020A7PS1704G/ Yuvraj Ahuja/ B.E. Computer Science

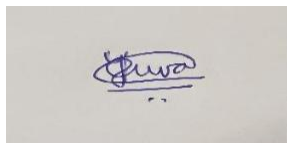**Name(s) and:** Anushree Mahur / SDE-1
Designation(s)
of the expert(s)

Name(s) of the: Prof Sugata Ghosal
PS Faculty

Project Areas: Backend Development

Abstract: This project deals with the migration of ADWS events from an older service (SPEC Exception Management Service) to a newer service. These will be migrated to the newer service called ComplianceDeviationIdentification [CDI]. It involves creating new packages and setting up the pipeline for deployment and dialup.

Signature of Student   Signature of PS Faculty

Date: 10 December, 2023
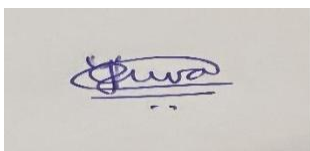
RESPONSE OPTION SHEET

Station: Amazon Development Centre, Gurugram

ID No. & Name: 2020A7PS1704G, Yuvraj Ahuja

Title of the Project: ReArchitecture – ADWS Events Migration

Usefulness of the project to the on-campus courses of study in various disciplines. Project should be scrutinized keeping in view the following response options. Write Course No. and Course Name against the option under which the project comes. Refer Bulletin for Course No. and Course Name.

Code No.	Response Option	Course No.(s) & Name
1.	A new course can be designed out of this project.	No
2.	The project can help modification of the course content of some of the existing Courses	No
3.	The project can be used directly in some of the existing Compulsory Discipline Courses (CDC)/ Discipline Courses Other than Compulsory (DCOC)/ Emerging Area (EA), etc. Courses	No
4.	The project can be used in preparatory courses like Analysis and Application Oriented Courses (AAOC)/ Engineering Science (ES)/ Technical Art (TA) and Core Courses.	No
5.	This project cannot come under any of the above mentioned options as it relates to the professional work of the host organization.	Yes

Signature of Student   Signature of Faculty

Date: 10 December, 2023   Date

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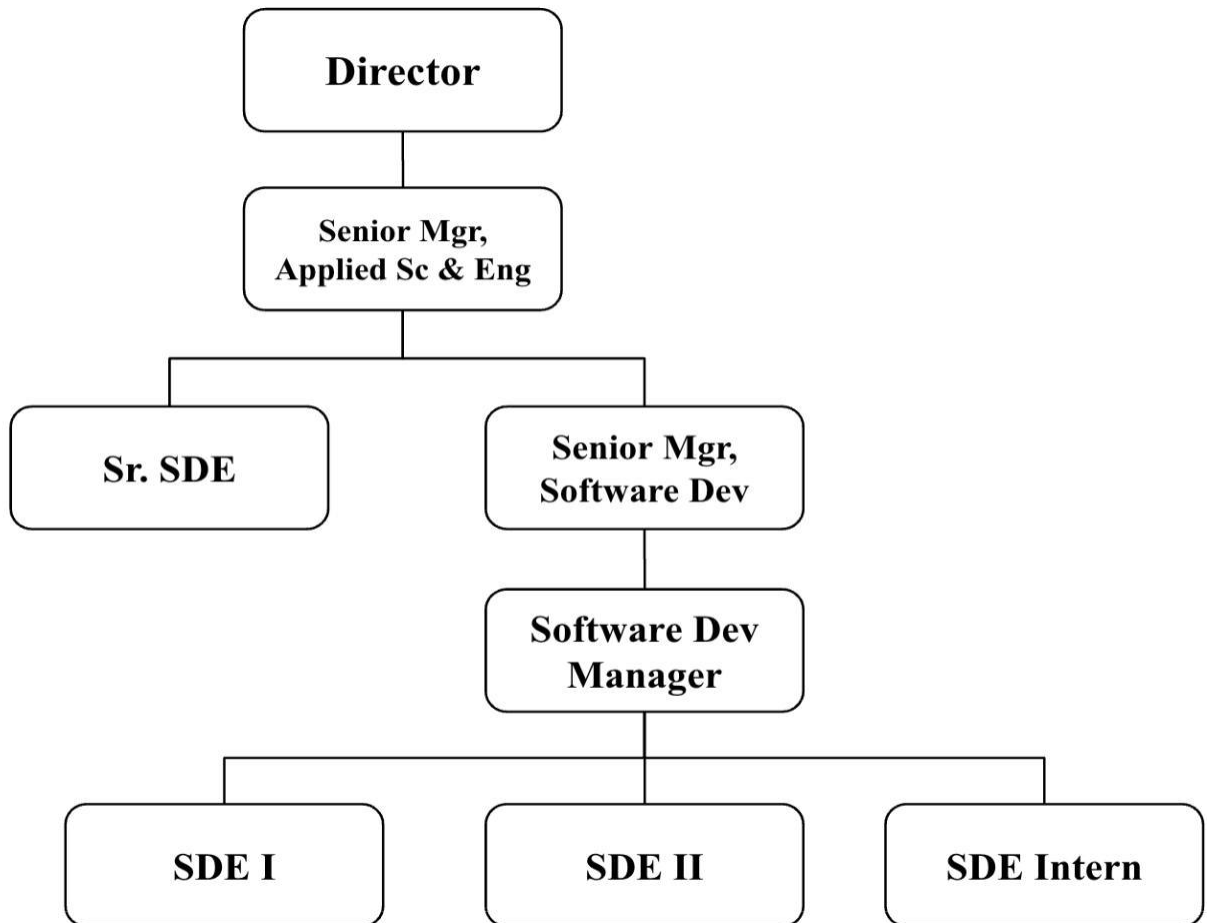
1. <u>Introduction:</u>

1.1. About the PS Station:

- Amazon is a multinational technology company that revolutionized e-commerce with its vast selection of products and commitment to customer satisfaction.

- It leverages advanced technologies, such as cloud computing and artificial intelligence, to enhance the shopping experience.

- With a customer-centric approach, Amazon offers fast shipping, competitive pricing, and personalized recommendations.

- The company also prioritizes sustainability and corporate social responsibility. Overall, Amazon's innovative approach, wide range of services, and global presence have established it as a leader in the industry.

1.2. Domain in which the PS station works:

- **E-commerce:** Amazon's primary domain, providing a vast online marketplace for buying and selling a wide range of products.

- **Cloud Computing:** Through Amazon Web Services (AWS), Amazon offers cloud computing services for businesses and individuals, including computing power, storage, and database solutions.

- **Digital Content:** Amazon provides digital content services, including e-books, music, movies, and streaming services like Amazon Prime Video and Amazon Music.

- **Logistics and Delivery:** Amazon operates an extensive logistics network, including warehouses, fulfillment centers, and delivery services, ensuring efficient and timely product delivery.

- **AI and Voice Assistance:** Amazon's virtual assistant, Alexa, powered by artificial intelligence, enables voice-controlled interactions and smart home integrations.

1.3. Organizational structure of PS station:

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                    ┌─────────────┐
                    │  Director   │
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                           │
                ┌──────────────────────┐
                │     Senior Mgr,       │
                │   Applied Sc & Eng    │
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   │   Sr. SDE   │              │     Senior Mgr,       │
   └─────────────┘              │    Software Dev       │
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              │    SDE I     │      │   SDE II    │      │ SDE Intern  │
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1.4. Software Process:

- **Scrum Team:** The Scrum team at Amazon typically consists of developers, testers, designers, and product owners, as well as people from other cross-functional departments. On certain tasks or features, these teams collaborate.

- **Sprint Planning:** To choose things from the product backlog for the following sprint, Amazon Scrum teams hold frequent sprint planning sessions. These are brief, timed intervals that typically last two to four weeks.

- **Daily Stand-up:** The Scrum team meets every morning to discuss the day's goals, challenges, and progress. This promotes openness and prompt problem-solving. To manage these tasks and their timeline effectively, documentation is kept.

2. **About the Project:**

- The project is related to migration of ADWS events from legacy SPEC Exception Management Service [SPEC-EM]. These will be migrated to a newer service called ComplianceDeviationIdentification [CDI]. It involves creating new packages and setting up the pipeline for deployment and dialup.

2.1. **Motivation:**

- Migration objectives are aimed at improving Amazon's ability to more easily manage capacity, scale fleets up and down, lower time spent on operations and lower costs.

2.2. **Objectives:**

- This migration will allow us to manage the service in a more robust way

- It will enable faster development cycles, reduced cost, greater optimization of hardware usage and build applications with highly available, highly scalable secure services.
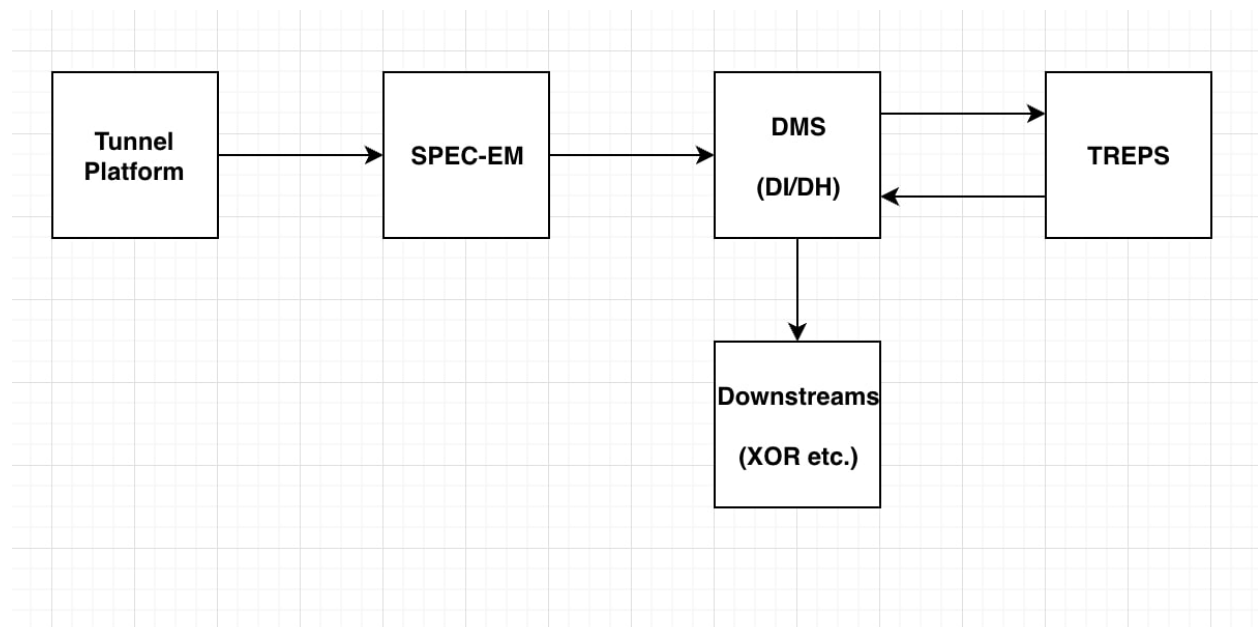
3. <u>Methodology:</u>

To migrate ADWS events to a different service, we will need to correct and optimise all dependencies that use it and find a solution for them to handle and correct potential deviation. Currently ADWS events use 2 AWS lambdas for their working. After the migration they will use 1 lambda making it more efficient.

3.1. Solution outline:

- We create subtasks to ensure that programming strategies aren't confusing to a third person trying to understand the workflow. This helps in better management of the code.
- New code shouldn't break old code because dialup will slowly take place

- Testing and Validation needs to be done in the end to ensure that the changes won't break anything when deployed to Production.
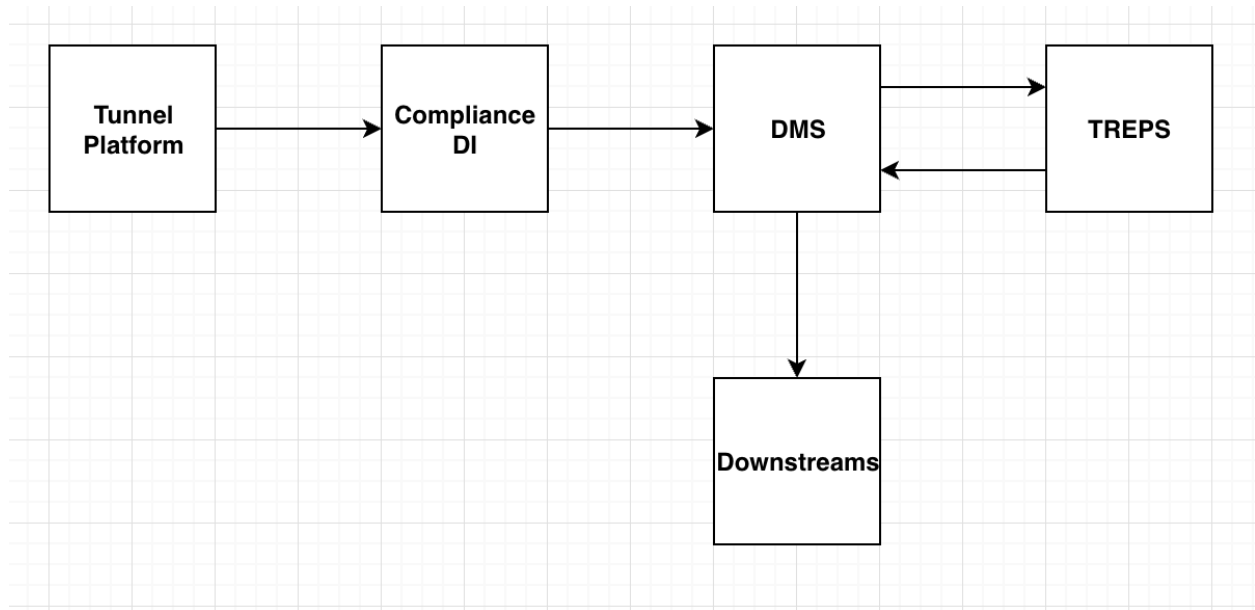
3.2/3.3 Architecture and Workflow

Old Architecture

New Architecture

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│   Tunnel     │─────▶│  Compliance  │─────▶│     DMS      │─────▶│    TREPS     │
│  Platform    │      │      DI      │      │              │◀─────│              │
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                                            │ Downstreams  │
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4.   <u>Technologies used:</u>

4.1.   Backend:

- Java for Backend development.

4.2.   Version control:

- An internal tool similar to GitHub built over Git.
- An internal tool to review codes and revert to a particular.

4.3.   Bug reporting:

- An internal tool used to raise tickets and bugs to relevant teams that deals with the service.

4.4.   Day-to-day tools:

- Quip, to document the work procedure.
- Amazon Chime, to attend standup meetings, and lead doc review meetings.
- Slack, to discuss day to day updates with team members.
- Asana Board, to keep track of all tasks and complete them before the deadline.

5. <u>Conclusion:</u>

5.1. Learning Outcome:

While performing ADWS migration, the following learning outcomes are gained:

- **High-Level and Low-Level Design:** Learnt how program architecture designing works

- **Infrastructure as Code:** Learned practical application of object-oriented programming

- **Scalability and Auto Scaling:** Understood how to design and create deployments that can scale horizontally based on demand, leveraging auto scaling policies and metrics to optimize resource allocation.

- **Monitoring and Logging:** Learned how to set up comprehensive monitoring and logging solutions using AWS CloudWatch and Timber tools to gain visibility into logs, monitor performance, and troubleshoot issues effectively.

- **Cost Optimization:** Explore strategies to optimize costs by right-sizing resources

6. <u>**Glossary:**</u>

<u>Major Services</u>

1. **Deviation Management Service (DM/DMS):** Manages deviation for every package that Amazon processes

2. **SPEC Exception Management Service (SPEC-EM):** Processes various use-cases for deviation management service (ADWS being one of them). One of the goals of our team is to deprecate this service hence migration was necessary.

3. **Compliance Deviation Identification (CDI):** Processes and identifies deviation for asynchronous events for DM to handle them.