



F13 TECHNOLOGIES



A PROJECT REPORT ON **SRS Recommendation** on **AWS Personalize**

Submitted by Team – Utsav

Sr. Name of Team members

1. Utsav Prajapati
2. Yashraj Chanchad
3. Gaurav Wasekar
4. Karthick S.

Mentor
Shreyash Ladhe

INDEX

- 1. Introduction**
- 2. Project Objectives**
- 3. System Architecture**
- 4. AWS Services Used**
- 5. Implementation Steps**
- 6. Recommendation Algorithms & Workflow**
- 7. Cost Analysis**
- 8. Challenges & Solutions**
- 9. Future Enhancements**
- 10. Conclusion**
- 11. References**

1. Introduction:

In today's digital age, businesses rely on recommendation systems to enhance user engagement and personalize customer experiences. This project focuses on building a **Content Recommendation System (CRS)** using **AWS Personalize**, which leverages machine learning to provide tailored recommendations based on user behavior and preferences.

The system was developed using **Amazon S3** for data storage, **AWS Personalize** for ML-based recommendations, and other AWS services to ensure scalability, efficiency, and cost-effectiveness.

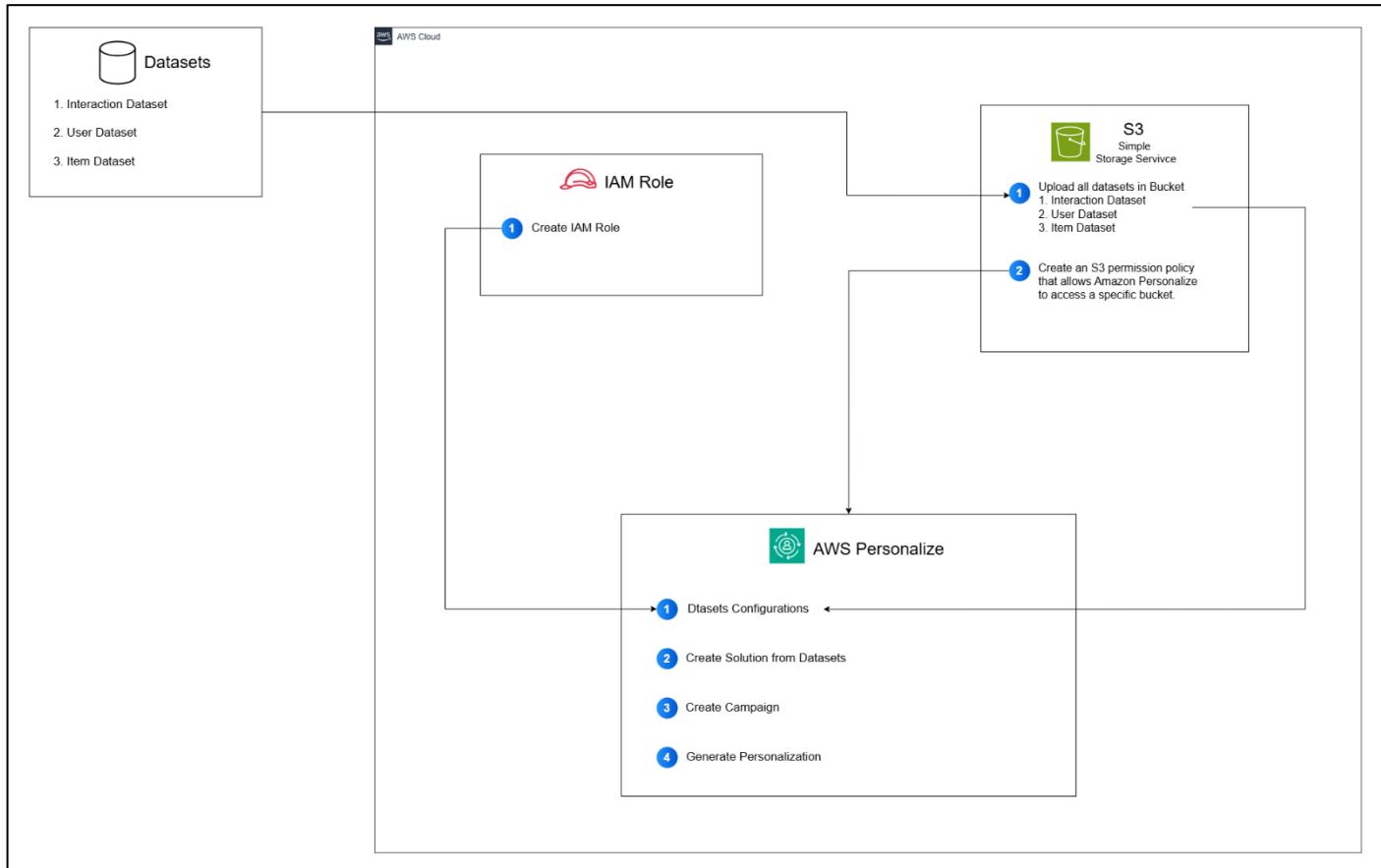
2. Objectives:

- Design and implement a **scalable recommendation system** on AWS.
- Utilize **AWS Personalize** for training and deploying recommendation models.
- Store and manage datasets in **Amazon S3**.
- Generate a **cost-effective** and **high-performance** solution.
- Provide a **detailed report** on the implementation, including algorithms, workflow, and cost analysis.

3. System Architecture

The architecture of the recommendation system consists of the following components:

1. **Data Storage (Amazon S3)** – Stores user interaction datasets.
2. **Data Processing (AWS Personalize)** – Processes data and trains ML models.
3. **Recommendation Engine (Personalize Campaigns)** – Generates real-time recommendations.



4. AWS Services Used

Service	Purpose
Amazon S3	Stores datasets (user interactions, items, etc.)
AWS Personalize	ML-based recommendation engine
IAM	Manages permissions for AWS resources
CloudWatch	Monitors system performance
API Gateway	Exposes APIs for frontend integration

5. Implementation Steps

Step 1: Dataset Preparation

- Collected and formatted user interaction data (e.g., clicks, purchases).
- Structured data in CSV format with columns: USER_ID, ITEM_ID, TIMESTAMP, EVENT_TYPE.

	A	B	C	D	E	F	G	H	I
1	ITEM_ID	SERVICE_NAME	CATEGORY	SERVICE_TIER	PRICE_RANGE	POPULARITY_SCORE	RELEASE_DATE	REQUIRED_SKILLS	TARGET_INDUSTRY
2	srv_01	Cloud Migration Service	Cloud	Premium	High	9.5	2023-05-10	AWS; Kubernetes; Terraform; IT, Finance	
3	srv_02	Digital Commerce Solutions	Digital Commerce	Standard	Medium	8.7	2022-11-15	Shopify; Magento; Spring; Retail, E-commerce	
4	srv_03	IT Consulting Services	Consulting	Premium	High	9.2	2021-08-20	IT Strategy; Enterprise Architecture; All industries	
5	srv_04	Network Security Solutions	Network Security	Enterprise	High	9.8	2023-03-25	Firewalls; IAM; Cybersecurity; Banking, IT	
6	srv_05	Process Consulting Services	Process Consulting	Standard	Medium	7.9	2020-07-30	Business Process Management; Data Science; Finance, Healthcare	
7	srv_06	Learning & Development	Learning & Development	Basic	Low	6.5	2019-12-10	Training; Coaching; Project Management; All industries	
8	srv_07	Accounting Services	Accounting	Standard	Medium	8.2	2021-06-05	Finance; Taxation; Audit; Finance, Retail	
9	srv_08	Financial Advisory Services	Financial	Enterprise	High	9	2022-03-18	Investment; Risk Management; Finance, Banking	
10	srv_09	Customer Communication	Customer Communication	Standard	Medium	8.4	2021-09-12	CRM; Marketing Automation; E-commerce, IT	
11	srv_10	Brand Communications	Brand Communications	Premium	High	9.1	2022-01-25	Public Relations; Branding; Retail, Marketing	
12	srv_11	Sentiment Analysis	Sentiment Analysis	Standard	Medium	7.8	2023-06-22	NLP; AI; Data Mining; E-commerce, IT	
13	srv_12	Bookkeeping Services	Bookkeeping	Basic	Low	6.9	2019-10-05	Accounting Software; Finance, Small Business	
14	sv_01	Cloud Migration Service	Cloud	Premium	High	9.5	2023-05-10	AWS; Kubernetes; Terraform; IT, Finance	
15	sv_02	Digital Commerce Solutions	Digital Commerce	Standard	Medium	8.7	2022-11-15	Shopify; Magento; Spring; Retail, E-commerce	
16	sv_03	IT Consulting Services	Consulting	Premium	High	9.2	2021-08-20	IT Strategy; Enterprise Architecture; All industries	
17	sv_04	Network Security Solutions	Network Security	Enterprise	High	9.8	2023-03-25	Firewalls; IAM; Cybersecurity; Banking, IT	
18	sv_05	Process Consulting Services	Process Consulting	Standard	Medium	7.9	2020-07-30	Business Process Management; Data Science; Finance, Healthcare	
19	sv_06	Learning & Development	Learning & Development	Basic	Low	6.5	2019-12-10	Training; Coaching; Project Management; All industries	
20	sv_07	Accounting Services	Accounting	Standard	Medium	8.2	2021-06-05	Finance; Taxation; Audit; Finance, Retail	
21	sv_08	Financial Advisory Services	Financial	Enterprise	High	9	2022-03-18	Investment; Risk Management; Finance, Banking	
22	sv_09	Customer Communication	Customer Communication	Standard	Medium	8.4	2021-09-12	CRM; Marketing Automation; E-commerce, IT	
23	sv_10	Brand Communications	Brand Communications	Premium	High	9.1	2022-01-25	Public Relations; Branding; Retail, Marketing	
24	sv_11	Sentiment Analysis	Sentiment Analysis	Standard	Medium	7.8	2023-06-22	NLP; AI; Data Mining; E-commerce, IT	
25	sv_12	Bookkeeping Services	Bookkeeping	Basic	Low	6.9	2019-10-05	Accounting Software; Finance, Small Business	
26	sv_01	Cloud Migration Service	Cloud	Premium	High	9.5	2023-05-10	AWS; Kubernetes; Terraform; IT, Finance	
27	sv_02	Digital Commerce Solutions	Digital Commerce	Standard	Medium	8.7	2022-11-15	Shopify; Magento; Spring; Retail, E-commerce	
28	sv_03	IT Consulting Services	Consulting	Premium	High	9.2	2021-08-20	IT Strategy; Enterprise Architecture; All industries	
29	sv_04	Network Security Solutions	Network Security	Enterprise	High	9.8	2023-03-25	Firewalls; IAM; Cybersecurity; Banking, IT	

X extended_updated_users.csv

	A	B	C	D	E	F	G	H	I
1	USER_ID	ROLE	INDUSTRY	COMPANY_SIZE	REGION	EXPERIENCE_LEVEL	AGE	ANNUAL_BUDGET	INTERESTS
2	usr_01	IT Manager	Finance	Enterprise	North America	Senior	45	500000	Cloud Security; Data
3	usr_02	Cloud Architect	IT Services	Mid-size	Europe	Senior	38	300000	Cloud Migration; Dev
4	usr_03	Startup Founder	SaaS	Small	Asia	Mid-Level	32	200000	Digital Commerce; A
5	usr_04	DevOps Engineer	E-commerce	Large	North America	Mid-Level	30	250000	Automation; Infrastru
6	usr_05	Security Consultant	Banking	Enterprise	Europe	Senior	50	700000	Network Security; Co
7	usr_06	Data Scientist	Healthcare	Mid-size	Asia	Junior	28	150000	Big Data; Machine L
8	usr_07	CTO	Manufacturing	Large	North America	Senior	48	600000	Enterprise Solutions;
9	usr_08	Software Engineer	IT Services	Small	Australia	Junior	26	100000	Development; Serv
10	usr_09	AI Researcher	Technology	Enterprise	Asia	Mid-Level	35	400000	AI; Deep Learning
11	usr_10	Business Analyst	Retail	Mid-size	South America	Mid-Level	33	280000	Data Analytics; E-co
12	usr_01	IT Manager	Finance	Enterprise	North America	Senior	45	500000	Cloud Security; Data
13	usr_02	Cloud Architect	IT Services	Mid-size	Europe	Senior	38	300000	Cloud Migration; Dev
14	usr_03	Startup Founder	SaaS	Small	Asia	Mid-Level	32	200000	Digital Commerce; A
15	usr_04	DevOps Engineer	E-commerce	Large	North America	Mid-Level	30	250000	Automation; Infrastru
16	usr_05	Security Consultant	Banking	Enterprise	Europe	Senior	50	700000	Network Security; Co
17	usr_06	Data Scientist	Healthcare	Mid-size	Asia	Junior	28	150000	Big Data; Machine L
18	usr_07	CTO	Manufacturing	Large	North America	Senior	48	600000	Enterprise Solutions;
19	usr_08	Software Engineer	IT Services	Small	Australia	Junior	26	100000	Development; Serv
20	usr_09	AI Researcher	Technology	Enterprise	Asia	Mid-Level	35	400000	AI; Deep Learning
21	usr_10	Business Analyst	Retail	Mid-size	South America	Mid-Level	33	280000	Data Analytics; E-co
22	usr_01	IT Manager	Finance	Enterprise	North America	Senior	45	500000	Cloud Security; Data
23	usr_02	Cloud Architect	IT Services	Mid-size	Europe	Senior	38	300000	Cloud Migration; Dev
24	usr_03	Startup Founder	SaaS	Small	Asia	Mid-Level	32	200000	Digital Commerce; A
25	usr_04	DevOps Engineer	E-commerce	Large	North America	Mid-Level	30	250000	Automation; Infrastru
26	usr_05	Security Consultant	Banking	Enterprise	Europe	Senior	50	700000	Network Security; Co
27	usr_06	Data Scientist	Healthcare	Mid-size	Asia	Junior	28	150000	Big Data; Machine L
28	usr_07	CTO	Manufacturing	Large	North America	Senior	48	600000	Enterprise Solutions;
29	usr_08	Software Engineer	IT Services	Small	Australia	Junior	26	100000	Development; Serv

X Interaction_extended.csv

	A	B	C	D	E	F	G	H
1	USER_ID	ITEM_ID	EVENT_TYPE	TIMESTAMP	SESSION_DURATION	DEVICE_TYPE	LOCATION	USER_RATING
2	usr_01	srv_04	VIEWED	1742033100	5min	Desktop	New York, USA	4.5
3	usr_01	srv_06	VIEWED	1742041800	3min	Mobile	New York, USA	4
4	usr_02	srv_01	VIEWED	1741965600	7min	Tablet	London, UK	4.7
5	usr_02	srv_03	TRIAL_STARTED	1741971600	15min	Desktop	London, UK	4.8
6	usr_03	srv_02	VIEWED	1741864200	4min	Mobile	Mumbai, India	4.2
7	usr_04	srv_05	VIEWED	1741785300	6min	Desktop	San Francisco, USA	4.6
8	usr_04	srv_09	PURCHASED	1741789800	20min	Mobile	San Francisco, USA	4.9
9	usr_05	srv_08	VIEWED	1741711500	9min	Desktop	Berlin, Germany	4.3
10	usr_06	srv_11	TRIAL_STARTED	1741597800	12min	Tablet	Tokyo, Japan	4.5
11	usr_07	srv_07	PURCHASED	1741545600	25min	Mobile	Sydney, Australia	5
12	usr_08	srv_10	VIEWED	1741469400	5min	Desktop	Melbourne, Australia	4.1
13	usr_09	srv_12	TRIAL_STARTED	1741349100	10min	Tablet	Shanghai, China	4.4
14	usr_10	srv_01	VIEWED	1741270800	7min	Mobile	Buenos Aires, Argent	4.6
15	usr_02	srv_03	TRIAL_STARTED	1628884882	15min	Desktop	London, UK	4.8
16	usr_09	srv_12	TRIAL_STARTED	1637504249	10min	Tablet	Shanghai, China	4.4
17	usr_04	srv_09	PURCHASED	1683026064	20min	Mobile	San Francisco, USA	4.9
18	usr_04	srv_05	VIEWED	1609501996	6min	Desktop	San Francisco, USA	4.6
19	usr_05	srv_08	VIEWED	1698061855	9min	Desktop	Berlin, Germany	4.3
20	usr_03	srv_02	VIEWED	1619240218	4min	Mobile	Mumbai, India	4.2
21	usr_08	srv_10	VIEWED	1620046158	5min	Desktop	Melbourne, Australia	4.1
22	usr_05	srv_08	VIEWED	1644404868	9min	Desktop	Berlin, Germany	4.3
23	usr_07	srv_07	PURCHASED	1629154983	25min	Mobile	Sydney, Australia	5
24	usr_04	srv_05	VIEWED	1616668171	6min	Desktop	San Francisco, USA	4.6
25	usr_04	srv_05	VIEWED	1629943045	6min	Desktop	San Francisco, USA	4.6
26	usr_02	srv_01	VIEWED	1672237846	7min	Tablet	London, UK	4.7
27	usr_02	srv_03	TRIAL_STARTED	1651090545	15min	Desktop	London, UK	4.8
28	usr_10	srv_01	VIEWED	1674849714	7min	Mobile	Buenos Aires, Argent	4.6
29	usr_04	srv_05	VIEWED	1649944283	6min	Desktop	San Francisco, USA	4.6

Step 2: Uploading Dataset to S3

- Created an S3 bucket and uploaded the dataset.
- Ensured proper IAM permissions for AWS Personalize access.

The screenshot shows the AWS S3 console with the 'srbs' bucket selected. The 'Objects' tab is active, displaying three CSV files: 'Interaction.csv', 'items.csv', and 'users.csv'. Each file is listed with its name, type (CSV), last modified date (March 27, 2025, 19:20:59 UTC+05:30), size (68.1 KB, 122.1 KB, 96.2 KB respectively), storage class (Standard), and an 'Actions' dropdown menu. The left sidebar shows various AWS services like Lambda, EC2, VPC, and Storage Lens.

Step 3: Setting Up AWS Personalize

1. Created a Dataset Group – Defined schema for interactions, users, and items.
2. Imported Data – Configured data import job from S3.
3. Trained Model – Selected algorithm (HRNN, Popularity Count, etc.).
4. Deployed Campaign – Generated real-time recommendations.

The screenshot shows the AWS S3 console with the 'srbs' bucket selected. The 'Properties' tab is active for the 'Interaction.csv' object. The 'Object overview' section shows the owner (aws67135b6cca7bb1f6188ef85eb6d0c027e63479a1189f20d79d393d70578c), AWS Region (Asia Pacific (Mumbai) ap-south-1), Last modified (March 27, 2025, 19:20:59 UTC+05:30), Size (68.1 KB), Type (CSV), and Key (Interaction.csv). The 'Object management overview' section includes Bucket properties (Bucket Versioning: Disabled) and Management configurations (Replication status: None). The bottom of the screen shows the Windows taskbar with various pinned icons.

Screenshot of the AWS S3 console showing the properties of the 'items.csv' object in the 'sr3b' bucket.

Object overview

- Owner:** 3ab67155b6cca7bb1f6188ef65eb6d0c0d27e63479a1189f2bd78d393d70578c
- AW5 Region:** Asia Pacific (Mumbai) ap-south-1
- Last modified:** March 27, 2025, 19:20:52 (UTC+05:30)
- Size:** 122.1 KB
- Type:** csv
- Key:** items.csv

Object management overview

The following bucket properties and object management configurations impact the behavior of this object.

Bucket properties

Bucket Versioning: When enabled, multiple variants of an object can be stored in the bucket to easily recover from unintended user actions and application failures.
⚠️ **Disabled**

Management configurations

Replication status: When a replication rule is applied to an object the replication status indicates the progress of the operation.
-

[View replication rules](#)

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Screenshot of the AWS S3 console showing the properties of the 'users.csv' object in the 'sr3b' bucket.

Object overview

- Owner:** 3ab67155b6cca7bb1f6188ef65eb6d0c0d27e63479a1189f2bd78d393d70578c
- AW5 Region:** Asia Pacific (Mumbai) ap-south-1
- Last modified:** March 27, 2025, 19:20:56 (UTC+05:30)
- Size:** 96.2 KB
- Type:** csv
- Key:** users.csv

Object management overview

The following bucket properties and object management configurations impact the behavior of this object.

Bucket properties

Bucket Versioning: When enabled, multiple variants of an object can be stored in the bucket to easily recover from unintended user actions and application failures.
⚠️ **Disabled**

Management configurations

Replication status: When a replication rule is applied to an object the replication status indicates the progress of the operation.
-

[View replication rules](#)

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Screenshot of the AWS S3 Bucket configuration page for 'snsb' in the Asia Pacific (Mumbai) region.

Block all public access: Off

Bucket policy:

```
{ "Version": "2012-10-17", "Statement": [ { "Effect": "Allow", "Principal": "*", "Action": [ "s3:GetObject", "s3:ListBucket" ], "Resource": [ "arn:aws:s3:::snsb", "arn:aws:s3:::snsb/*" ] } ] }
```

Object Ownership:

Control ownership of objects written to this bucket from other AWS accounts and the use of access control lists (ACLs). Object ownership determines who can specify access to objects.

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- 17:52
- ENG IN
- 29-03-2025

Screenshot of the AWS IAM Roles page in the us-east-1 region.

Identity and Access Management (IAM)

Access management:

- User groups
- Users
- Roles**
- Polices
- Identity providers
- Account settings
- Root access management

Access reports:

- Access Analyzer
- External access
- Unused access
- Analyzer settings
- Credential report
- Organization activity
- Service control policies
- Resource control policies

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- 29-03-2025

Screenshot of the AWS IAM Role details page for 'AmazonPersonalize-srs'.

Summary

- Creation date: March 26, 2025, 20:53 (UTC+05:30)
- Last activity: Yesterday
- ARN: arn:aws:iam::970547377311:role/AmazonPersonalize-srs
- Maximum session duration: 1 hour

Permissions

Permissions policies (1) [Info](#)

You can attach up to 10 managed policies.

Policy name	Type	Attached entities
AmazonS3ReadOnlyAccess	AWS managed	1

Permissions boundary (not set)

Generate policy based on CloudTrail events

You can generate a new policy based on the access activity for this role, then customize, create, and attach it to this role. AWS uses your CloudTrail events to identify the services and actions used and generate a policy. [Learn more](#)

[Generate policy](#)

No requests to generate a policy in the past 7 days.

Screenshot of the AWS Policies details page for 'AmazonS3ReadOnlyAccess'.

Policy details

Type	Creation time	Edited time	ARN
AWS managed	February 07, 2015, 00:10 (UTC+05:30)	August 11, 2023, 03:01 (UTC+05:30)	arn:aws:iam::awspolicy/AmazonS3ReadOnlyAccess

Permissions defined in this policy [Info](#)

Permissions defined in this policy document specify which actions are allowed or denied. To define permissions for an IAM identity (user, user group, or role), attach a policy to it.

[Search](#)

Services Actions in S3 (77 of 163)

[Show remaining 86 actions](#)

Action	Resource	Request condition
DescribeJob	All resources	None
DescribeMultiRegionAccessPointOperation	All resources	None
GetAccelerateConfiguration	All resources	None
GetAccessGrant	All resources	None
GetAccessGrantsInstance	All resources	None
GetAccessGrantsInstanceForPrefix	All resources	None
GetAccessGrantsInstanceResourcePolicy	All resources	None

Screenshot of the AWS IAM Policy details page for the "AmazonS3ReadOnlyAccess" policy.

Identity and Access Management (IAM)

AmazonS3ReadOnlyAccess Info

Provides read only access to all buckets via the AWS Management Console.

Policy details

Type: AWS managed	Creation time: February 07, 2015, 00:10 (UTC+05:30)	Edited time: August 11, 2023, 03:01 (UTC+05:30)	ARN: arn:aws:iam::awspolicy/AmazonS3ReadOnlyAccess
-------------------	---	---	--

Permissions Entities attached Policy versions Last Accessed

Permissions defined in this policy Info

Permissions defined in this policy document specify which actions are allowed or denied. To define permissions for an IAM identity (user, user group, or role), attach a policy to it.

Actions in S3 Object Lambda (12 of 26)

Read (8 of 8)

Action	Resource	Request condition
GetObject	All resources	None
GetObjectAcl	All resources	None
GetObjectLegalHold	All resources	None
GetObjectRetention	All resources	None
GetObjectTagging	All resources	None
GetObjectVersion	All resources	None
GetObjectVersionAcl	All resources	None

Show remaining 14 actions

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Screenshot of the AWS IAM Role details page for the "AmazonPersonalize-srs" role.

Identity and Access Management (IAM)

AmazonPersonalize-srs Info

Allows S3 to call AWS services on your behalf.

Summary

Creation date: March 26, 2025, 20:53 (UTC+05:30)	ARN: arn:aws:iam::970547377311:role/AmazonPersonalize-srs
Last activity: Yesterday	Maximum session duration: 1 hour

Permissions Trust relationships Tags Last Accessed Revoke sessions

Trusted entities

Entities that can assume this role under specified conditions.

```
1+ [ {  
2   "Version": "2012-10-17",  
3   "Statement": [  
4     {  
5       "Effect": "Allow",  
6       "Principal": {  
7         "Service": "personalize.amazonaws.com"  
8       },  
9       "Action": "sts:AssumeRole"  
10     }  
11   ]  
12 } ]
```

Edit trust policy

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Chat [Alt+S]

aws Search

Lambda EC2 S3 VPC

Amazon Personalize > Dataset groups > System_Recommendation_System_new > Overview

Introducing user deletion

You can now delete all references to specific users from an Amazon Personalize dataset group. This makes it easier to maintain GDPR compliance and manage your data.

Create data deletion job

Overview Info

Step 1. Create datasets and import data Info

Import your data into Amazon Personalize datasets. All use cases require an item interactions dataset. Some may require additional datasets. To learn more about different dataset requirements, see [Preparing training data](#).

Create dataset

3/5 datasets active

Step 2. Run data analysis - *optional* Info

Run data analysis to learn about your data and what actions you can take to optimize it for Amazon Personalize. Data analysis considers data only in item interactions, users, and items datasets.

Run data analysis

Analysis not run

Step 3. Set up training and recommendation resources Info

1. Create solutions to train models on specific recipes that best suit your use cases.

Create solutions

2. To get item and action recommendations, create campaigns or batch inference jobs. To get user segments, create batch segmentation jobs.

Get recommendations

CloudShell Feedback

99°F Mostly sunny

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Chat [Alt+S]

aws Search

Lambda EC2 S3 VPC

Amazon Personalize > Dataset groups > System_Recommendation_System_new > Datasets > Interaction

Interaction

Modify dataset Delete

Dataset overview

Dataset name: Interaction

Dataset type: Item Interactions

Dataset ARN: arn:aws:personalize:ap-south-1:197054737731:dataset/System_Recommendation_System_new/INTERACTIONS

Status: Active

Jobs Event tracker Schema Tags

Dataset import jobs (1)

Create dataset import job

Name	Import job status	Import mode	Created
srsdatas	Active	Replace dataset	Thu, 27 Mar 2025 13:52:51 GMT

Dataset export jobs (0)

Create dataset export job

Name	Export job status	Created
No dataset export jobs		

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Screenshot of the Amazon Personalize console showing the dataset schema configuration.

Dataset type: Item Interactions

Schema:

```
1 [ { "type": "record", "name": "Interactions", "namespace": "com.amazonaws.personalize.schema", "fields": [ { "name": "USER_ID", "type": "string" }, { "name": "ITEM_ID", "type": "string" }, { "name": "EVENT_TYPE", "type": "string" }, { "name": "TIMESTAMP", "type": "long" } ] }
```

JSON Line 1, Column 1 | Errors: 0 | Warnings: 0

Screenshot of the Amazon Personalize console showing the dataset overview and import/export jobs.

Dataset overview:

- Dataset name:** Interaction
- Dataset ARN:** arn:aws:personalize:ap-south-1:197054737731:dataset/System_Recommendation_System_new/INTERACTIONS
- Status:** Active

Dataset import jobs (1):

Name	Import job status	Import mode	Created
srsdatas	Active	Replace dataset	Thu, 27 Mar 2025 13:52:51 GMT

Dataset export jobs (0):

Name	Export job status
No dataset export jobs	

Screenshot of the Amazon Personalize console showing the 'Users' dataset overview. The dataset name is 'Users', the dataset type is 'Users', and the ARN is arn:aws:personalize:ap-south-1:970547377311:dataset/System_Recommendation_System_new/USERS. The status is Active.

Dataset import jobs (1)

Name	Import job status	Import mode	Created
users	Active	Replace dataset	Thu, 27 Mar 2025 13:54:10 GMT

Dataset export jobs (0)

Name	Export job status
No dataset export jobs	

Screenshot of the Amazon Personalize console showing the 'users' dataset import job details. The import job name is 'users', the ARN is arn:aws:personalize:ap-south-1:970547377311:dataset-import-job/users, and the status is Active. The import mode is Replace dataset, the data location is s3://srbd/Users.csv, and the role ARN is arn:aws:iam:970547377311:role/AmazonPersonalize-srs. The import job was created on Thu, 27 Mar 2025 13:54:10 GMT.

Tags (0) info

No tags associated with this resource.

Screenshot of the AWS Personalize console showing the schema for a dataset named "Users".

Dataset type: Users

Schema:

```
1 [ { 2   "type": "record", 3   "name": "Users", 4   "namespace": "com.amazonaws.personalize.schema", 5   "fields": [ 6     { 7       "name": "USER_ID", 8       "type": "string" 9     }, 10    { 11       "name": "ROLE", 12       "type": "string", 13       "categorical": true 14     }, 15    { 16       "name": "INDUSTRY", 17       "type": "string", 18       "categorical": true 19     }, 20    { 21       "name": "COMPANY_SIZE", 22     } 23  } ]
```

JSON Line 1, Column 1 | Errors: 0 | Warnings: 0

Screenshot of the AWS Personalize console showing the details of a dataset import job named "srstdatas".

Dataset import job details:

- Import job name:** srstdatas
- Import mode:** Replace dataset
- Import job ARN:** arn:aws:personalize:ap-south-1:970547377311:dataset-import-job/srstdatas
- Data location:** s3://srstdb/Interaction.csv
- Role ARN:** arn:aws:iam:970547377311:role/AmazonPersonalize-srs

Tags (0) Info: A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value
No tags	

No tags associated with this resource. Manage tags

Screenshot of the Amazon Personalize console showing the dataset overview for 'System_Recommendation_System_new'.

Dataset Overview:

- Dataset name:** items
- Dataset type:** Items
- Dataset ARN:** arn:aws:personalize:ap-south-1:970547377311:dataset/System_Recommendation_System_new/ITEMS
- Status:** Active

Dataset import jobs (1):

Name	Import job status	Import mode	Created
itemss	Active	Replace dataset	Thu, 27 Mar 2025 13:55:18 GMT

Create dataset import job

Dataset export jobs (0):

Name	Export job status

No dataset export jobs
No dataset export jobs associated with this resource.

CloudShell Feedback

Screenshot of the Amazon Personalize console showing the details of a specific dataset import job named 'itemss'.

Dataset import job details:

Import job name	Import mode	Import job created
itemss	Replace dataset	Thu, 27 Mar 2025 13:55:18 GMT

Import job ARN: arn:aws:personalize:ap-south-1:970547377311:dataset-import-job/itemss

Import job status: Active

Data location: s3://srbd/items.csv

Role ARN: arn:aws:iam:970547377311:role/AmazonPersonalize-srs

Tags (0) info:
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value

No tags
No tags associated with this resource.

Manage tags

CloudShell Feedback

Screenshot of the Amazon Personalize console showing the dataset schema configuration. The schema defines an 'Items' record with fields: ITEM_ID (string), SERVICE_NAME (string, categorical), CATEGORY (string, categorical), and SERVICE_TIER (string).

```
1 [ {  
2     "type": "record",  
3     "name": "Items",  
4     "namespace": "com.amazonaws.personalize.schema",  
5     "fields": [  
6         {  
7             "name": "ITEM_ID",  
8             "type": "string"  
9         },  
10        {  
11            "name": "SERVICE_NAME",  
12            "type": "string",  
13            "categorical": true  
14        },  
15        {  
16            "name": "CATEGORY",  
17            "type": "string",  
18            "categorical": true  
19        },  
20        {  
21            "name": "SERVICE_TIER",  
22        }  
23    ]  
24 } ]
```

Screenshot of the Amazon Personalize console showing the 'Solutions and recipes' section. It displays a single solution named 'srsf13' which is active and uses the 'aws-user-personalization-v2' recipe. The solution was created on March 27, 2025, at 19:30 (UTC+5:50).

Name	Status	Recipe used	Automatic training	Created	Latest solution version
srsf13	Active	aws-user-personalization-v2	On	March 27, 2025, 19:30 (UTC+5:50)	solutions

Screenshot of the AWS Personalize console showing the 'srsf13' solution details.

Solution overview

- Recipe:** aws-user-personalization-v2
- Event type:** -
- Created:** March 27, 2025, 02:00 PM (UTC +00:00)

Training configuration

Solution versions (1)

Solution version ID	Solution version status	Training type	Created
solutions	Active	Manual	March 27, 2025, 19:54 (UTC+5:30)

Campaign using the solution (1)

Name	Status	Solution version ID	Created
-	-	-	-

CloudShell Feedback

Screenshot of the AWS Personalize console showing the 'solutions' section.

Solution version overview

- Solution version ARN:** arn:aws:personalize:ap-south-1:970547377311:solution/srsf13/solutions
- Recipe ARN:** arn:aws:personalize::recipe/aws-user-personalization-v2
- Training duration:** 1829 hours
- Training type:** Manual
- Training mode:** Full
- Created:** March 27, 2025, 02:04 PM (UTC +00:00)
- Status:** Active

Solution version metrics

Normalized discounted cumulative gain	Precision	Mean reciprocal rank	Coverage
At 5 0.6327	At 5 0.3000	At 25 0.7083	1.0000
At 10 0.6703	At 10 0.1750		
At 25 0.7052	At 25 0.0800		

CloudShell Feedback

Solution version overview

- Solution version ARN:** arn:aws:personalize:ap-south-1:970547377311:solution/srft13/solutions
- Recipe ARN:** arn:aws:personalize:recipe:aws-user-personalization-v2
- Training duration:** 1.829 hours
- Created:** March 27, 2025, 02:04 PM (UTC +0:00)
- Status:** Active

Normalized discounted cumulative gain	Precision	Mean reciprocal rank	Coverage
At 5 0.6327	At 5 0.3000	At 25 0.7083	1.0000
At 10 0.6708	At 10 0.1750		
At 25 0.7052	At 25 0.0600		

Step 4: Testing Recommendations

- Used GetRecommendations API to fetch suggestions.
- Integrated with a sample frontend for demonstration.

Campaign inference

To get recommendations for this campaign in your application, use the `getRecommendations` API call. You can learn more about the usage and requirements for this API call in the documentation and the other links listed below.

- [Amazon Personalize GetRecommendations Developer Guide](#)

Campaign ARN info

arn:aws:personalize:ap-south-1:970547377311:campaign/My-srs-campaigns

Test campaign results

Before you use your campaign in your application, you can view the recommendations it generates here.

User ID - Info

This is the user ID of the user you want to see campaign results for. This user ID needs to be obtained from your item-interactions or user dataset.

Filter name - optional

Choose an existing filter to apply to your user segments or create a new filter.

Create new filter

Context - optional

Provide context as key/value pairs.

Key	Value
Enter a metadata attribute	Enter value

Add new context

Recommendations (12) Info

Recommendations include up to 25 items or actions. Any promoted items are distributed randomly. For some custom recipes, the reason column lists if the item is included through exploration or as a popular item placeholder.

Recommendation ID RID-93-49b9-8280-33d8308205b2-CID-151cf1

Item ID	Score	Recommendation reason	SERVICE_NAME	TARGET_INDUSTRY	POPULARITY_SCORE
svr_06	0.2009827	-	Learning & Development Programs	All industries	6.5
svr_01	0.1256948	-	Cloud Migration Services	IT, Finance	9.5
svr_02	0.1214125	-	Digital Commerce Solutions	Retail, E-commerce	8.7
svr_07	0.1078192	-	Accounting Services	Finance, Retail	8.2
svr_05	0.0832761	-	Process Consulting	Finance, Healthcare	7.9
svr_03	0.0758693	-	IT Consulting Services	All industries	9.2
svr_08	0.0731037	-	Financial Advisory Services	Finance, Banking	9.0
svr_12	0.0698127	-	Bookkeeping Services	Finance, Small Business	6.9
svr_11	0.0479287	-	Sentiment Analysis & Opinion Mining	E-commerce, IT	7.8
svr_10	0.0357847	-	Brand Communication & PR	Retail, Marketing	9.1
svr_09	0.0328891	-	Customer Communication Management	E-commerce, IT	8.4
svr_04	0.0068162	-	Network Security Solutions	Banking, IT	9.8

6. Recommendation Algorithms & Workflow

AWS Personalize supports multiple algorithms:

- HRNN (User-Personalization) – Best for real-time recommendations.
- Popularity-Based – Recommends trending items.
- Similar Items – Suggests related products.

Workflow:

1. User interacts with the system (e.g., clicks an item).
2. Data is logged in S3.
3. AWS Personalize processes data and updates recommendations.
4. Frontend displays personalized suggestions.

7. Cost Analysis

Service	Estimated Cost (Monthly)
Amazon S3	\$0.023 per GB
AWS Personalize	\$0.24 per training hour

Total Estimated Cost: ~50–50–100/month (depending on usage).

8. Challenges & Solutions

Challenge	Solution
Data formatting issues	Used AWS Glue for preprocessing
High latency in recommendations	Optimized Personalize campaign settings
Cost overruns	Applied AWS Free Tier & budget alerts

9. Future Enhancements for the AWS-Based Recommendation System

To further improve the IT Service Recommendation System, several enhancements can be implemented to enhance performance, scalability, and user experience.

1. Real-Time Data Processing with Amazon Kinesis

Currently, the system relies on batch processing, which may introduce latency in recommendations. By integrating Amazon Kinesis Data Streams, we can capture real-time user interactions such as clicks, searches, and purchases. This data can be processed, enabling dynamic updates to recommendations. This enhancement ensures faster and more responsive suggestions, improving user engagement.

2. Multi-Model Recommendations (A/B Testing)

A single recommendation algorithm may not cater to all user segments effectively. To address this, we can deploy multiple models such as HRNN, Popularity-Based, and Similar Items. Leveraging Amazon Personalize A/B Testing, we can compare the performance of these models and optimize recommendations for different user groups, such as new versus returning users. This approach ensures tailored suggestions that align with user preferences.

3. Integration with Frontend (AWS Amplify + React.js)

Manual API calls from the frontend can be inefficient and slow. By building a React.js dashboard with AWS Amplify, we can seamlessly integrate the recommendation system with the frontend. Utilizing GraphQL (AWS AppSync) will allow real-time fetching of recommendations, enhancing the user experience with dynamic and interactive content.

4. Cold-Start Problem Mitigation

New users and items often lack sufficient historical data for accurate recommendations. To mitigate this, we can implement hybrid models that combine collaborative filtering with content-based filtering. Additionally, metadata-based recommendations, such as suggesting items popular among similar users, can help bridge the gap. This ensures better personalization even for new users or items.

5. Cost Optimization with Spot Instances & Auto-Scaling

Training recommendation models can be costly during peak periods. By using EC2 Spot Instances for non-critical training jobs and configuring auto-scaling, we can reduce costs while maintaining performance. This approach ensures cost efficiency without compromising system reliability.

6. Explainable AI for Recommendations

Users may distrust recommendations if they appear as "black-box" suggestions. Integrating Amazon SageMaker Clarify can provide explanations for recommendations, such as "Because you liked X." This transparency builds user trust and enhances the overall experience.

7. Cross-Platform Personalization (Mobile + Web)

Inconsistent recommendations across devices can frustrate users. By unifying user profiles with Amazon Cognito and syncing recommendations via DynamoDB, we can ensure a seamless experience across mobile and web platforms. This enhancement guarantees consistency and improves user satisfaction.

These future enhancements will significantly elevate the system's capabilities, making it more efficient, scalable, and user-friendly. By leveraging advanced AWS services and best practices, the recommendation system can deliver even greater value to businesses and end-users alike.

10. Conclusion

The **AWS-based Recommendation System** successfully delivers personalized content using **Amazon Personalize and S3**. The system is **scalable, cost-effective, and efficient**, making it suitable for businesses looking to enhance user engagement.

11. References

- AWS Personalize Documentation
- Amazon S3 Pricing Guide
- Research Papers on Recommendation Systems
