Track 2 | Session 6

利用 Amazon Personalize 個人化推薦 提升遊戲玩家體驗

Howard Hsiung

Territory Business Development Manager

Amazon Web Services

Alan Hsieh

CTO

Cloudware Technology
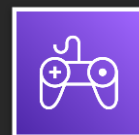
aws SUMMIT ONLINE

議程

- 人工智慧於遊戲的應用

- AWS 人工智慧服務於遊戲的應用與簡介

- Cloudware Technology 使用 Amazon Personalize 實例分享

- 總結

人工智慧於遊戲的應用

內容製作
- 虛擬配音員
- 圖片素材標籤、分類

開發測試
- 培養自動陪玩 NPC
- 自動創建關卡
- 測試難度是否適合

遊戲互動
- 即時翻譯增加玩家互動和交流，增加遊戲參與感

內容過濾
- 即時攔截玩家在遊戲中的不當言論與影像
- 社群輿情分析

人工智慧於遊戲的應用

行為預測

- 分析玩家喜好、付費模式，選擇購買的道具，進行生命週期的影響

客製化推薦

- 為每個玩家推薦個性化的內容與購買道具

運營優化

- 玩家留存率的改善與付費率的提升

遊戲反欺詐

- 進行欺詐檢測，保持遊戲公平，並檢查異常行為

AWS AI/ML 服務為您的遊戲創造更多可能性

AI 應用服務

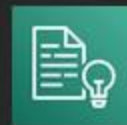| 影像識別	文字擷取	語音辨識	語音朗讀	語音轉文字	語言翻譯	語意辨識	智慧預測	智慧推薦
Amazon Rekognition	Amazon Textract	Amazon Lex	Amazon Polly	Amazon Transcribe	Amazon Translate	Amazon Comprehend	Amazon Forecast	Amazon Personalize

ML 平台服務

Amazon SageMaker

編譯 Build
Amazon SageMaker Ground Truth | Notebook | Model

訓練 Train
Train
- 一鍵式模型訓練與優化
- 強化學習

部署 Deploy
Deploy
- 一鍵模型部署
- 彈性伸縮

機器學習基礎架構

機器學習架構
AWS Deep Learning AMIs | TensorFlow on AWS | Apache MXNet on AWS
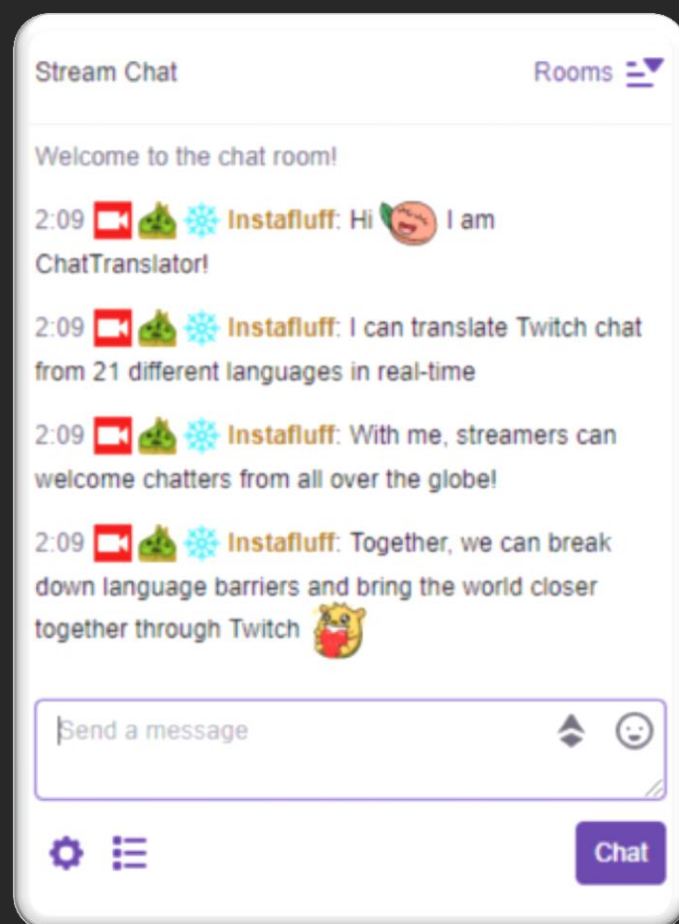
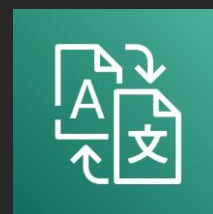### 基礎架構
EC2 P3 P3N | EC2 C5 | FPGAs | Greengrass | Elastic Inference

Amazon **Translate**

自然準確的語言翻譯服務
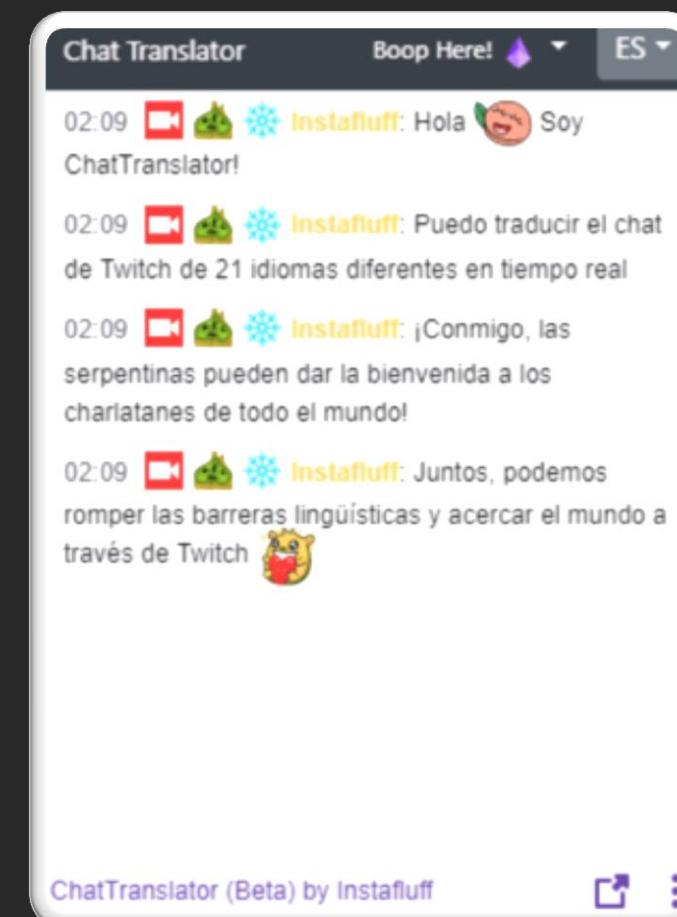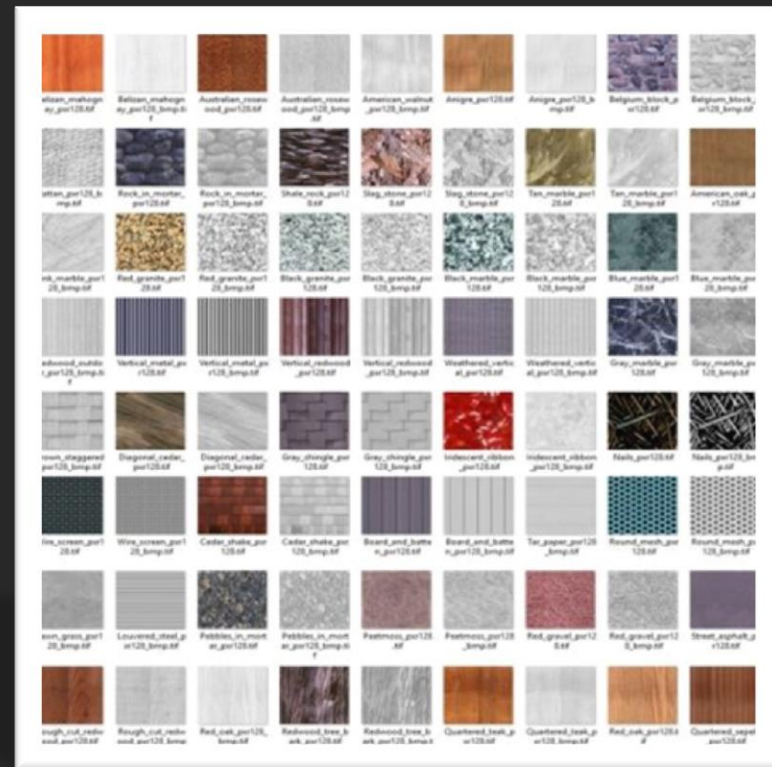

英文 → Amazon Translate → 西班牙文

Amazon Translate

Amazon Rekognition

以深度學習的影像辨識服務

遊戲素材
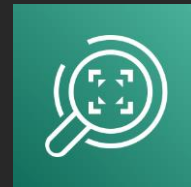
Amazon
Rekognition
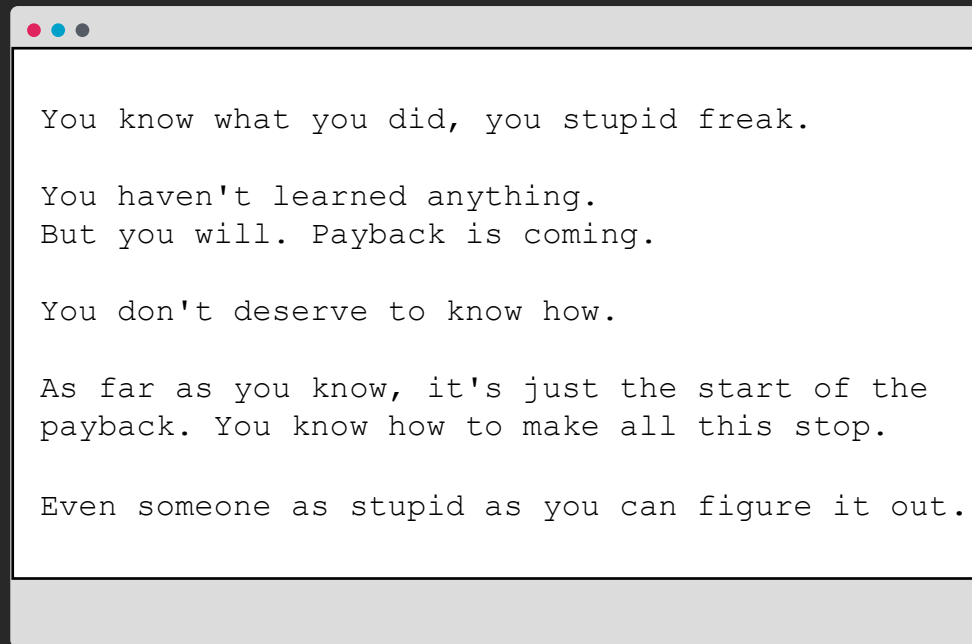
識別視頻中潛在、不適宜的
內容,如色情或暴力等

快速分析與處理遊戲
素材影像

辨識用戶自創道具與角
色特色,瞭解玩家喜好

Amazon Comprehend

基於深度學習的自然語言處理服務

You know what you did, you stupid freak.

You haven't learned anything.
But you will. Payback is coming.

You don't deserve to know how.

As far as you know, it's just the start of the
payback. You know how to make all this stop.

Even someone as stupid as you can figure it out.

遊戲中不當的言論
情感
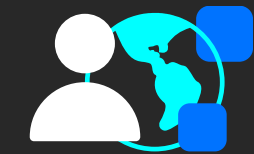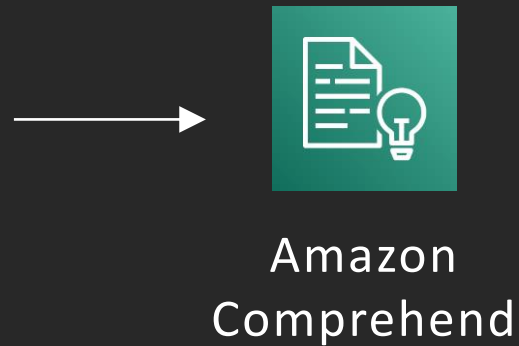
Amazon
Comprehend

文本

關鍵字

語言
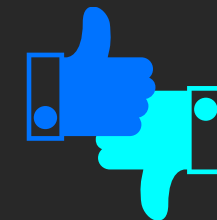
情感

用 AI 自動過濾不當內容的典型架構

透過玩家聊天視窗中 Amazon Rekognition 或 Amazon Comprehend 等服務的 API
即可自動判斷內容性質，快速得到識別結果。
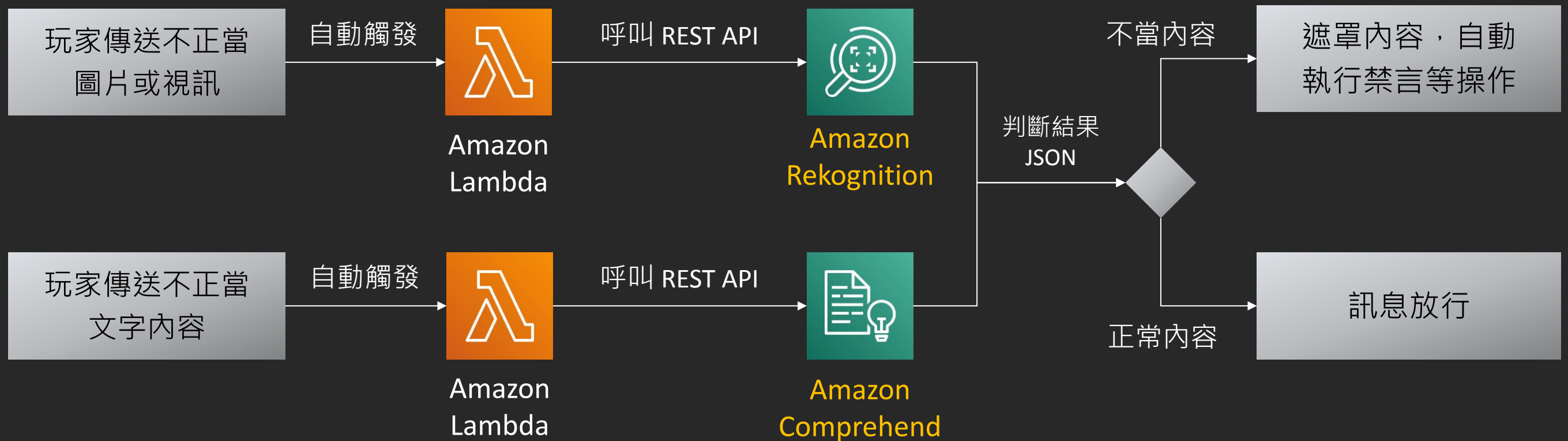
Amazon Polly

便捷的文字轉語音服務

遊戲文稿 → Amazon Polly → 遊戲角色語音
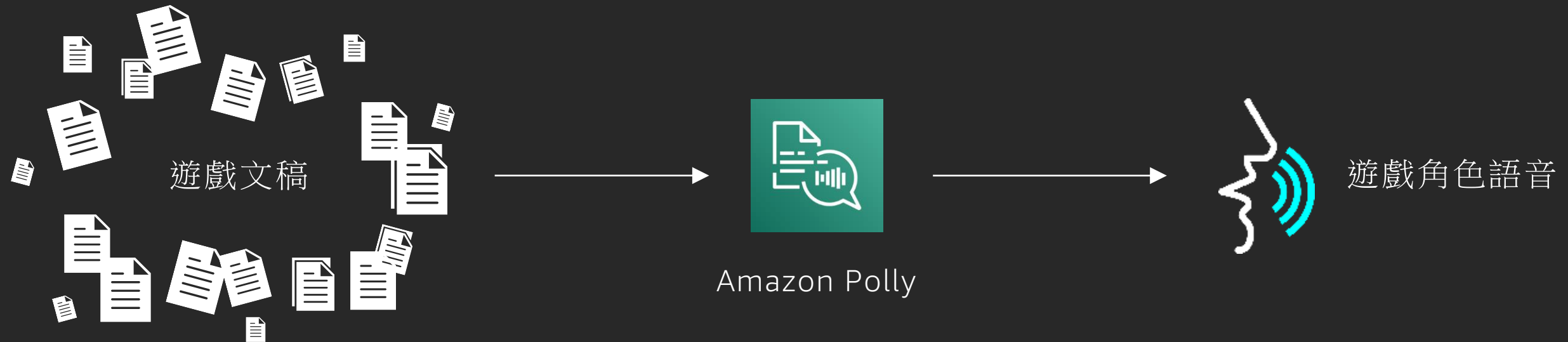
Amazon Polly 是文字轉語音服務，利用深度學習技術來合成酷似人聲的語音。
您可以快速且順暢地在遊戲中生成逼真的音訊，支援超過 25 種不同語言和獨特的聲音

Amazon Fraud Detector & Amazon Personalize

反欺詐服務和個人化推薦服務

Amazon Fraud Detector 為使用機器學習驅動的反欺詐服務，無需自行建構模型的經驗 關於遊戲的付款紀錄同時可透過此服務進行即時反欺詐。

Amazon Fraud Detector

歷史行為資料

帳號註冊　消費歷史

結果行動規則

載入 資料

檢查 資料

豐富 資料

訓練 模型

優化 模型

測試 模型

部署 模型

欺詐 評分

結果規則 評估

採取行動

Amazon Personalize

從遊戲程式中抽取使用者特徵（點擊、頁面瀏覽、註冊、購買等），**對於玩家在遊戲內的購物，自動推薦感興趣的道具或購買模式。** 並克服如新用戶沒有數據、流行存在偏差以及用戶喜好持續變化等常見問題。

How Cloudware Technology used Amazon Personalize to improve player engagements

Alan Hsieh
CTO
Cloudware Technology

aws SUMMIT ONLINE

Player Behaviors

- Everyone has their favorite games

- Everyone has different purposes for playing games

- Most players don't spend time to find the games they want to play

Player Behaviors

- Everyone has their favorite games

    → Cannot show the same games for every player

- Everyone has different purposes for playing games

    → Trace and analyze behaviors for each player

- Most players don't spend time to find the games they want to play

    → Let the players see their favorite games as early as possible

Have their own personalized game list for each player

Agenda

- What we do in Amazon Personalize

- How to control the processes by AWS Step Functions

- Cloudware System Architecture

- How to integrate to the current system

Personalize - Steps

Data Ingestion

- Datasets
- Event Trackers
- Import Jobs

Train Model

- Solutions and recipes

Inference

- Campaigns
- Batch Inference Jobs

Personalize - Dataset & Schema

- ## Item
  ITEM_ID

- ## User
  USER_ID

- ## User-Item
  USER_ID, ITEM_ID, EVENT_TYPE, EVENT_VALUE, TIMESTAMP

Personalize - Dataset & Schema

```
{
    "type": "record",
    "name": "Items",
    "namespace": "com.amazonaws.personalize.schema",
    "fields": [
        {
            "name": "ITEM_ID",
            "type": "string"
        },
        {
            "name": "CATEGORY",
            "type": "string",
            "categorical": true
        }
    ],
    "version": "1.0"
}
```

Recommendation System Solutions

- ## Content-based
  Similar attributes, Evaluation

- ## Memory-based
  User-base, Item base in Collaborative Filtering

- ## Model-based
  KNN, SVD in Collaborative Filtering

- ## Session-based
  RNN

Amazon Personalize – Solutions and Recipe

AutoML can automatically choose the most appropriate recipe based on its analysis

Manual

- HRNN
- HRNN-Metadata
- HRNN-Codestart
- Ranking
- Popularity-Count
- SIMS

AutoML

- HRNN
- HRNN-Metadata

https://docs.aws.amazon.com/zh_tw/personalize/latest/dg/working-with-predefined-recipes.html

Personalize - Recipe Parameters

A recipe is made up of an algorithm with hyperparameters, and feature transformation.

	Manual	AutoML
Recipe	Choose defined algorithm by yourself	Auto choose better from HRNN, HRNN-Metadata
Perform HPO	Support all but Popularity-count Customize config	Default config
Feature Transformation Parameters	Support all Customize config	Default config
Algorithm Hyperparameters	Support all but Popularity-count Customize config	Default config

Amazon Personalize – Solution Version Metric
Splits the data by randomly selecting 90% as training data and 10% as testing data

- Normalized discounted cumulative gain (NDCG)

- Precision

- Mean reciprocal rank

- Coverage

```
response = personalize.get_solution_metrics (
        solutionVersionArn = 'solution version arn'
)
```

Amazon Personalize – Tuned Hyperparameters

Know how Personalize tunes the model by hyperparameters

- bptt

    Default : 43, [32, 256]

- hidden_dimension

    Default : 32, [2, 32]

- recency_mask

    Default : True

https://docs.aws.amazon.com/zh_tw/personalize/latest/dg/native-recipe-hrnn.html

Amazon Personalize – Inference

- ## Campaigns
  Timely, Event trackers

```
response = personalizeRt.get_recommendations (
      campaignArn = 'Campaign ARN',
      userId = 'User ID'
)
```

- ## Batch Inference Jobs
  Massive, Acceptable delay

```
personalize_rec.create_batch_inference_job (
      solutionVersionArn = "Solution version ARN",
      jobName = "Batch job name",
      roleArn = "IAM role ARN",
      jobInput = {
            "s3DataSource": {"path": S3 input path}
      },
      jobOutput = {
            "s3DataDestination": {"path":S3 output path"}
      }
)
```

Amazon Personalize - Case

- ## Data Ingestion
  Import Job

- ## Solution and Recipe
  AutoML (HRNN-Metadata, HPO Enable)

- ## Inference
  Batch Inference Job

- ## Integration
  Step Functions

AWS Step Functions

Use that to control the recommendation steps with personalize
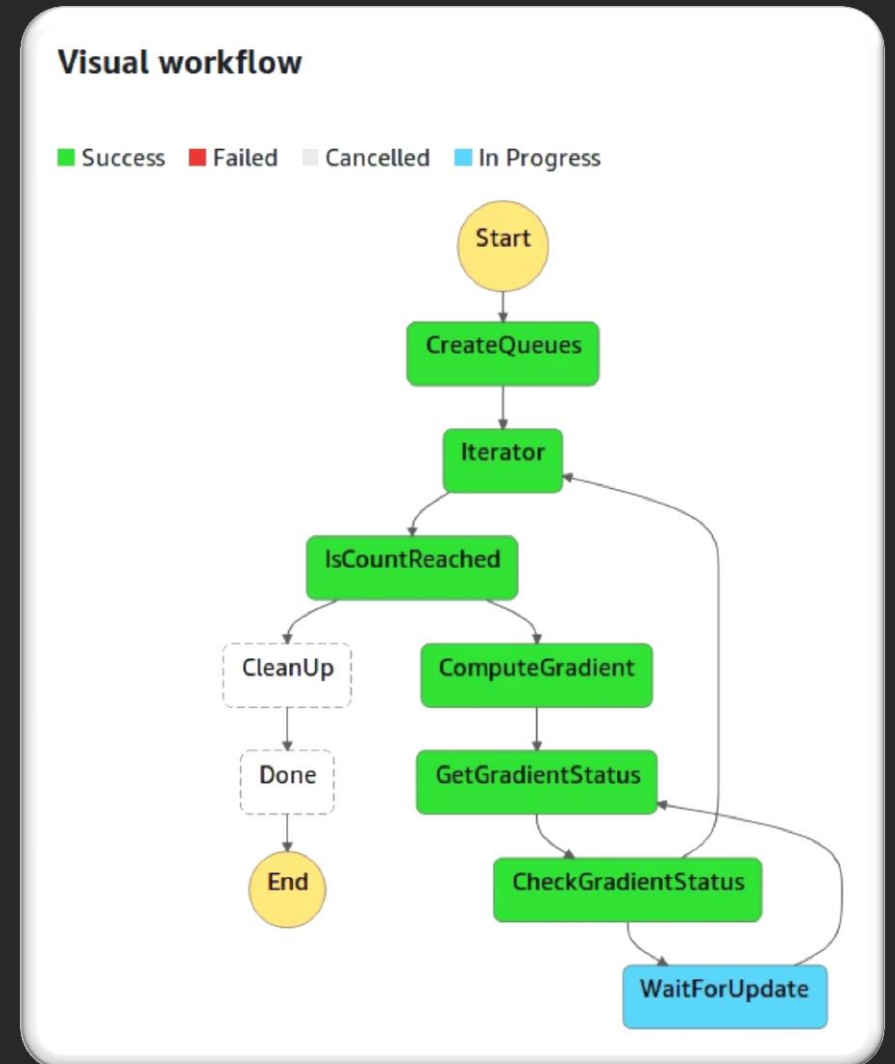
- ## Integrate managed services to one flow

  Lambda, DynamoDB, ECS, EMR, SNS, SQS, Glue, CodeBuild, SageMaker, Batch

- ## Clearly to know what steps we do and status
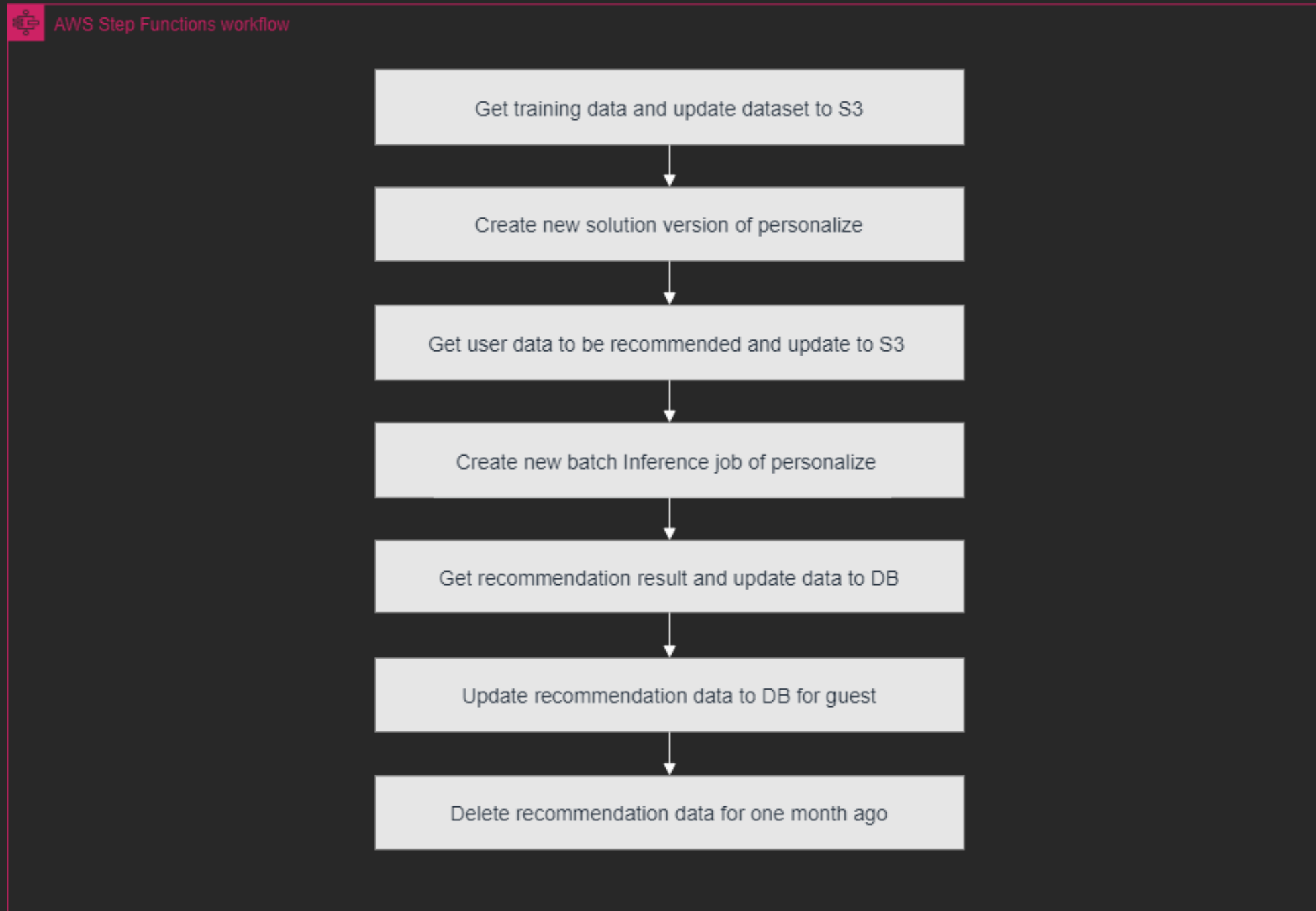
  Definition, Visualize Steps

- ## Reduce code for process control

  Pass, Task, Choice, Wait, Succeed, Fail, Parallel, Map

Visual workflow

■ Success ■ Failed ■ Cancelled ■ In Progress

Start → CreateQueues → Iterator → IsCountReached → CleanUp → Done → End

IsCountReached → ComputeGradient → GetGradientStatus → CheckGradientStatus → WaitForUpdate
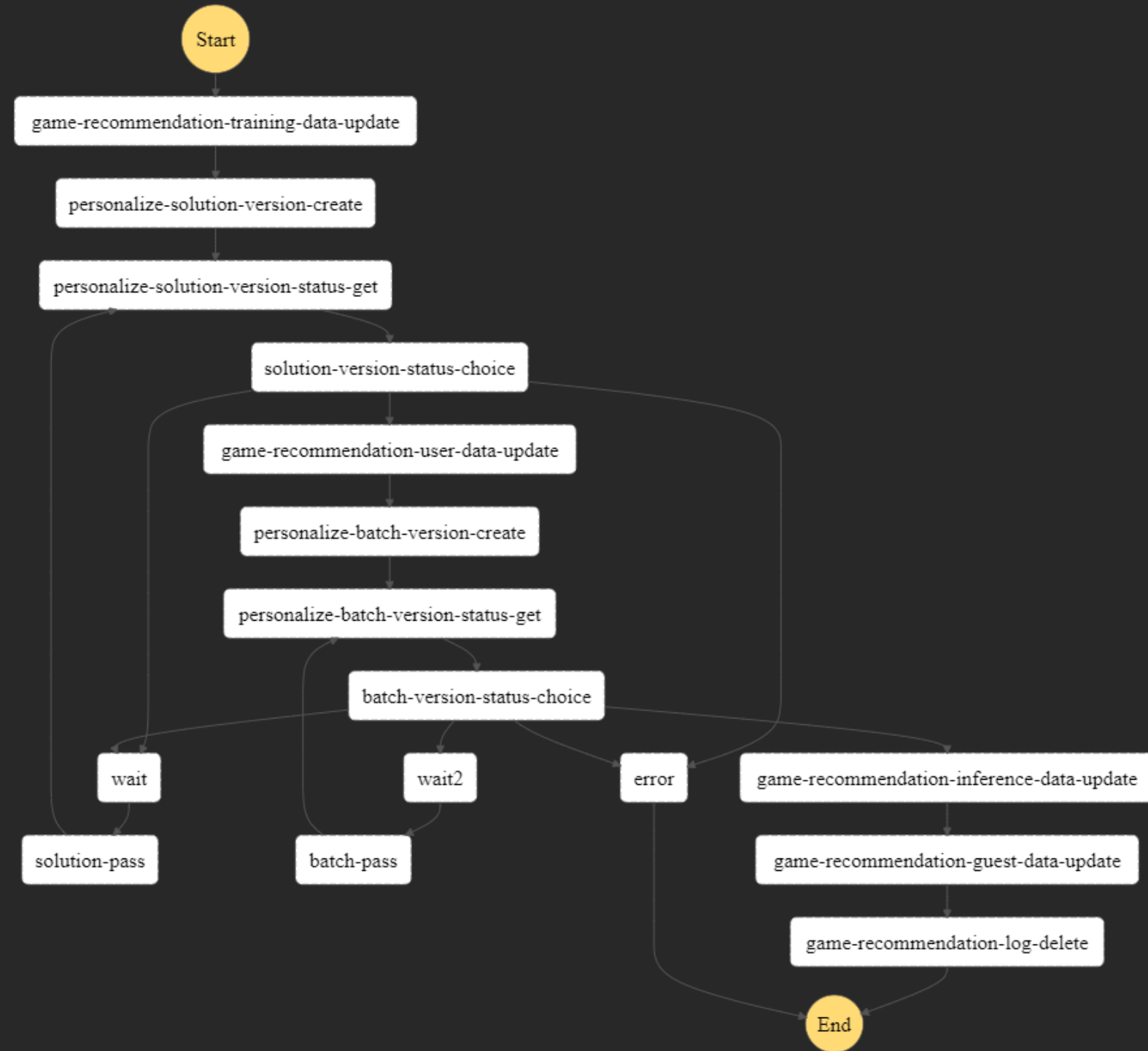
AWS Step Functions For Personalize - Flow

AWS Step Functions For Personalize - Definition Graph

Cloudware System Architecture

FRONTEND

| Website | APP |

CHANNEL

Third Party

BFF

| Web API | Streaming API | Cache |

BACKEND

| Service | Worker | Job |

AI

AI

DATA

| Center DB | Business DB | Analysis DB | Storage |

MONITOR

| Metric | Log | Alarm | Hystrix | DTS |
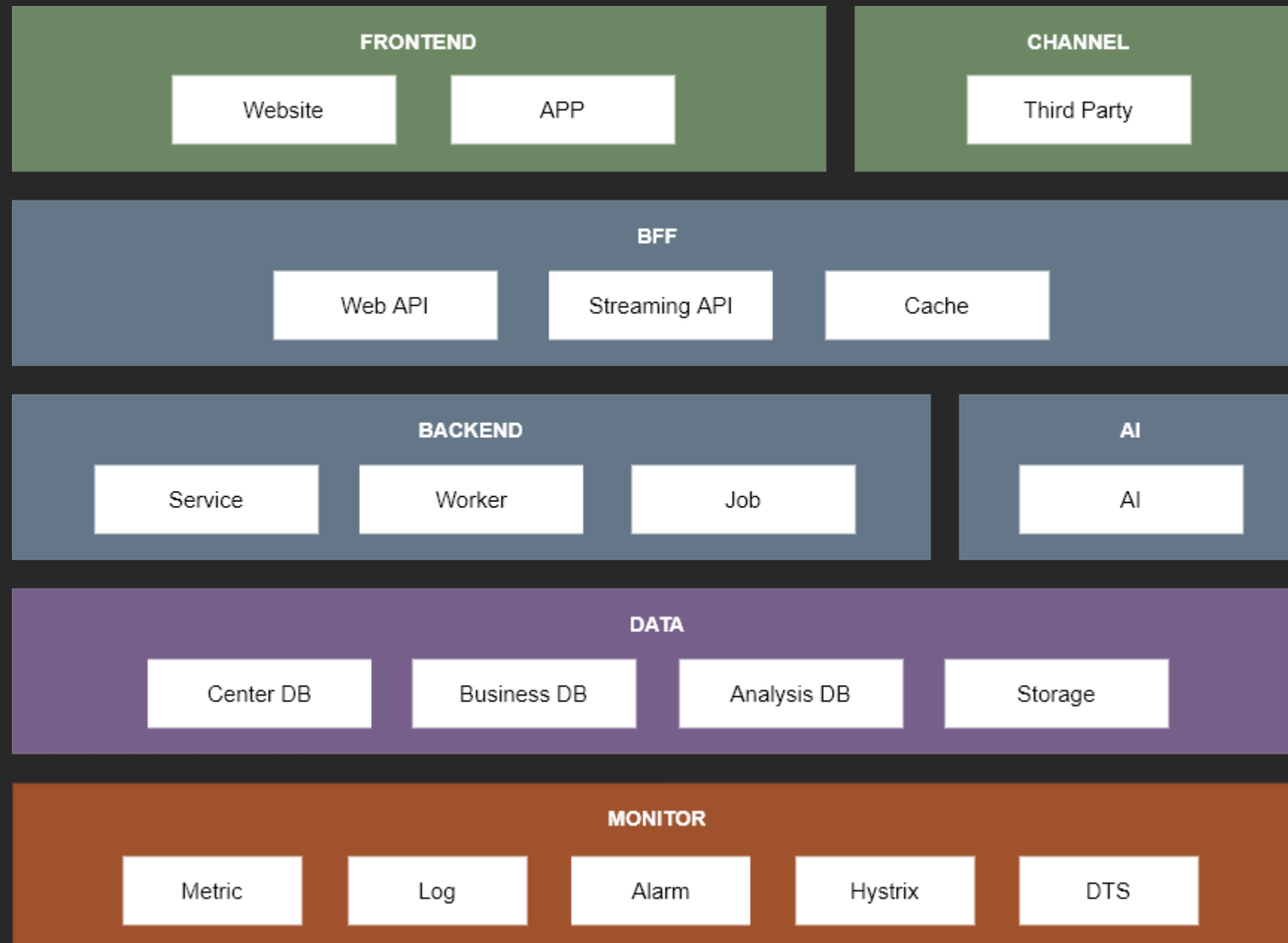
How to Integrate to the Current System
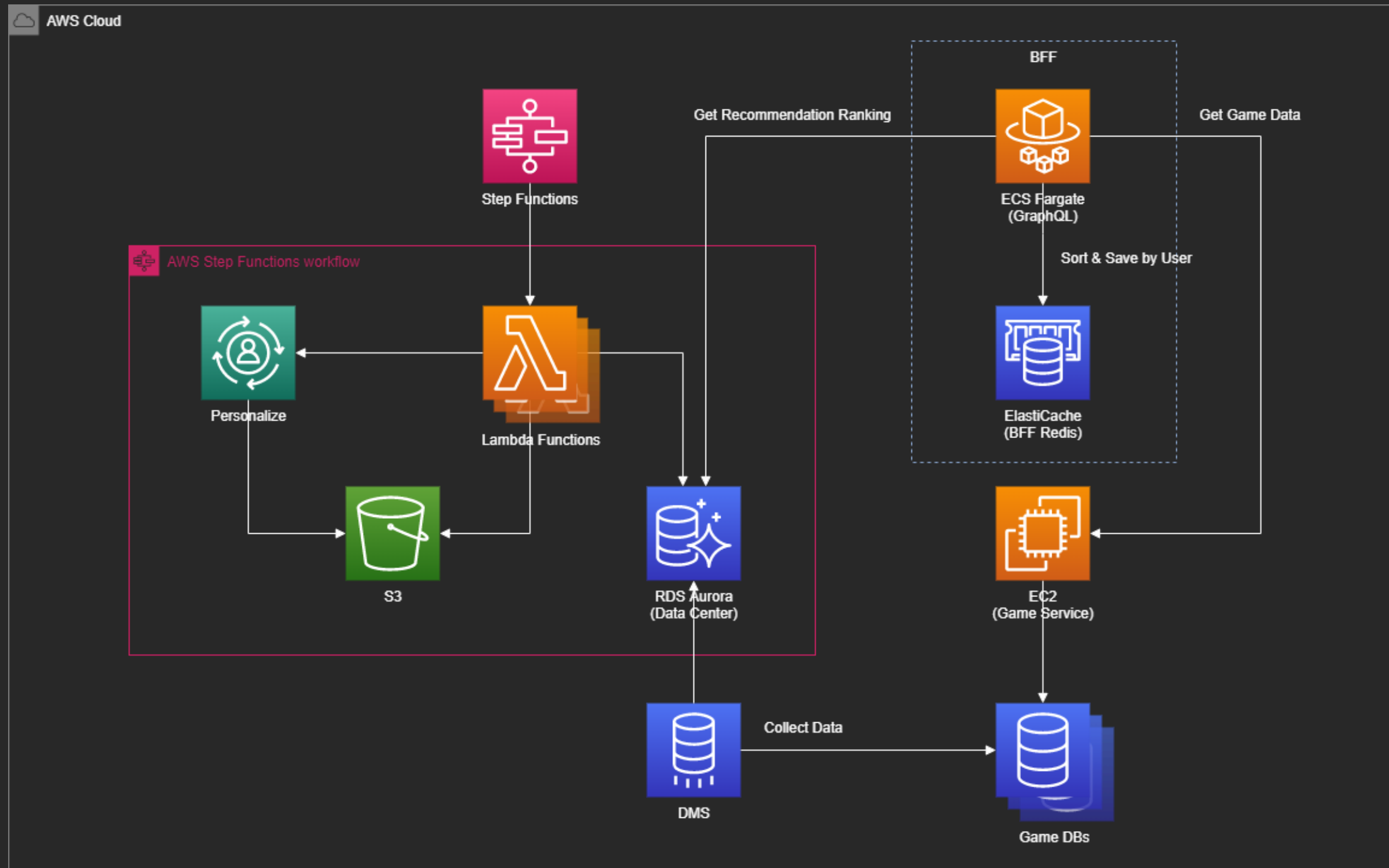
Experience

- Understand player behavior and what content we need to provide is very important

- Plan and use managed, serverless services then spend time on data analysis

- Periodically review solution version metrics to adjust data and parameters

Thank you!

資料分析

數據採集

流資料採集
Amazon Kinesis Data Streams
Amazon Kinesis Data Firehose

資料湖

ETL 與資料目錄
AWS Glue

資料儲存
Amazon S3
Amazon Glacier

快速建構資料湖
AWS Lake Formation

資料處理與分析

大數據處理
Amazon EMR

資料倉儲
Amazon Redshift

即時資料分析
Amazon Elasticsearch Service

跨資料來源查詢與分析
Amazon Athena

儀錶板與報表展現
Amazon QuickSight

遊戲研發

遊戲引擎:Amazon Lumberyard

遊戲開發平台服務

認證
Amazon Cognito

訊息管理
Amazon SNS

終端機測試
AWS Device Farm

符合及工作階段管理
Amazon GameLift

關聯型資料庫
Amazon RDS / Aurora

鍵值型資料庫
Amazon DynamoDB
Amazon DocumentDB

快取資料庫
Amazon ElastiCache

AI (機器學習)服務

影像識別 API
Amazon Rekognition

語音辨識 API
Amazon Lex

語義理解 API
Amazon Comprehend

語音朗讀 API
Amazon Polly

機器學習自動化平臺
Amazon SageMaker SageMaker Ground Truth

機器學習架構
AWS Deep Learning AMIs

部署執行

網路服務

虛擬網路
Amazon VPC

全球網域名稱解析
Amazon Route 53

內容分發(CDN)
Amazon CloudFront

網路接入加速
Amazon Global Accelerator

集中網路路由
Amazon Transit Gateway

物理專線
AWS Direct Connect

計算服務

彈性計算系列
Amazon EC2
EC2 Auto Scaling
Elastic Load Balancing

容器系列
Amazon ECS
Amazon EKS
AWS Fargate

無伺服器運算 (Serverless)
Amazon Lambda

運維管理服務

記錄與監控
Amazon CloudWatch
AWS CloudTrail

自動化運維
AWS CloudFormation
AWS Systems Manager

安全與合規服務

DDoS 攻擊抵禦
AWS Shield
AWS WAF

帳號安全管理
AWS IAM
AWS Organizations

市場推廣

Amazon.com

廣告投放
Amazon Advertising

遊戲周邊商品銷售
Merch by Amazon

Amazon AppStore

虛擬貨幣
Amazon Coins

競賽運營
Amazon GameOn

實物獎勵
Amazon Moments

Twitch

直播間外掛程式
Twitch Extensions

直播資料分析
Twitch Insights

Twitch API
直播剪輯 API:Clips
遊戲對接 API:Games
直播流 API:Streams
使用者 API:Users / Identity

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Howard Hsiung

hsiung@amazon.com

Alan Hsieh

alanhsieh@cloudwaretw.com