Tech Design: New Release Automation

Background

The IN Prime Music Browse Home is the primary platform/channel for New Music discovery within the service. This is due to two reasons:
1) For listeners who rely on Music services like APM to notify them about new music/movie (music), prefer having a destination that they can go to, for the latest releases.
2) For listeners who learn about a new music release from other sources and come to our service to search for the track through find, may not find it within the first attempt. The APM find/search feature isn't reliable and often renders broken search experiences.

In order to ensure that we make New Music available for our listeners as quickly as possible - **aiming to achieve a real time TAT (turn around time) from the time of release**, we currently have 9 New Song widgets for nine different languages. These widgets are updated manually as and when a new release is received/published by the Label. However, the TAT of these manual updates can range from anything between 4 to 24 hours and that leads to an exceptionally poor CX.

Glossary

Term	Description
LR	Label Relations Team. This team coordinates with Music labels and curates content on the platform.
Symphony	Campaign Management tool. This is used on the Music platform to create/edit/place widgets.
Creative	A particular Symphony campaign is called a Creative. It has Content and Placement for widgets.

Problem Statement

Automate the existing manual process of updating newly released and curated ASINs in "New Release Widgets" on Music Platform.

Requirements

FUNCTIONAL REQUIREMENTS

1. Collect new ASINs from LR team, once they are curated
2. Automate update of New Release widgets with new ASINs based on their content language
   Following widgets need to be updated:
   a. New song Hindi
   b. New Song English
   c. New Song Punjabi
   d. New Song Tamil
   e. New Song Telugu
   f. New Song Malayalam
   g. New Song Bengali
   h. New Song Marathi
   i. New Song Kannada
3. Widgets to be updated across all clients
4. For duplicate ASINs, the most recent order of the ASINs will be respected and the older duplicate ASIN will be removed

NON-FUNCTIONAL REQUIREMENTS

1. Minimize SLA for updating New Release widgets. Current SLA is 4-24 hours after LR team shares curated ASINs.
2. Minimize additional effort by LR team to provide the curated ASINs.
3. Mechanism to override the list and order of ASINs in the widgets by Merchandising team

OUT OF SCOPE

1. Checking if the correct list of ASINs have been provided by LR
2. Quality Control to check if desired ASINs have been published

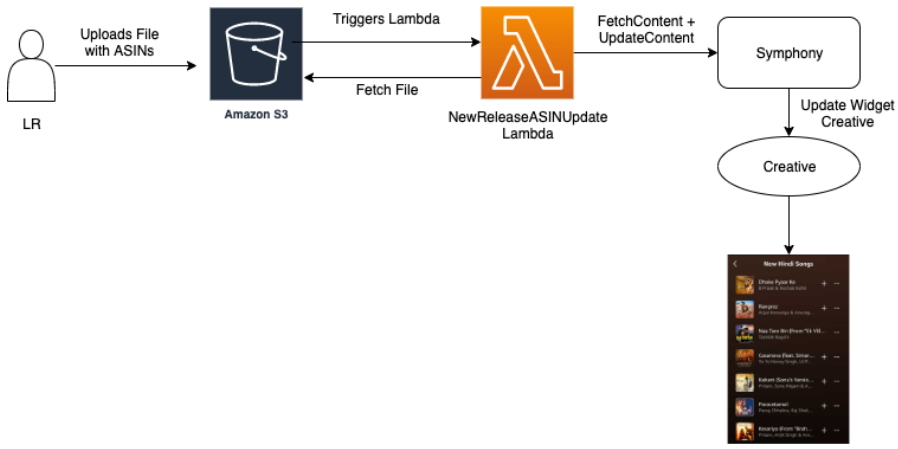
BRD: New Music Auto Update BRD

Existing Process

1. New ASINs are published by Catalog team and LR team is notified
2. LR team curates selected ASINs and performs verification with information shared by vendors and Catalog
3. LR team sends the list of new ASINs to-be-published over email to Merchandising team
4. Merchandising team updates Symphony campaigns for New Release widgets with new ASINs

Approach 1 (Recommended)

We can use a combination of uploading data in S3 Bucket and Lambda invocation.



Link

FETCHING ASIN DETAILS

Step 1: LR Team creates an file, with following details:
Content Language, Track ASIN

The ASINs need to be ordered on the basis of priority.

Content Language	Track ASIN
Punjabi	ABCD123
Punjabi	ABCD456
Marathi	DEFG123
Marathi	DEFG456
Hindi	XYZ123

The ASINs need to be ordered based on the priority from top to bottom.
For e.g. if the desired order of Punjabi ASINs in New Punjabi Songs is :
ABCD123
ABCD456
Then the file should also have the ASINs in same order i.e. ASIN in position 1 is at top of the list and so on.
The file should only contain the incremental new ASINs to be added in widgets, and NOT the complete list of ASINs for a widget.

There are no limits on number of ASINs that can be added in one file.
The file format will be in **.csv** format.

Step 2: LR Team signs in AWS S3 Console and uploads the excel file in the S3 bucket

We can create a Conduit IAM role to just provide access to one S3 bucket. By granting granular access via IAM role, there will be no permission leakage and the process will be streamlined for LR.
The IAM role will be managed by a LDAP group where LR POCs can be added.

Step 3: The S3 bucket upload action triggers a Lambda function

UPDATING WIDGETS

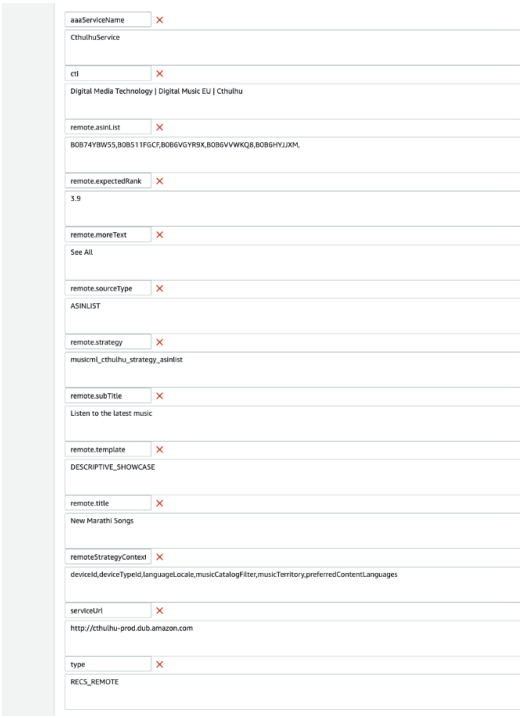
Once triggered, the Lambda function fetches the uploaded object from S3 bucket.
Then we need to parse the excel file to collect ASINs and their language.

We can use SymphonyAPI to manage and update Symphony campaigns for New Release widgets.

For the current scenario, we can perform following operations:

1. Collect all the ASINs for a particular language
2. Fetch the Symphony campaign-id for the language
3. Call SymphonyAPI to fetch the Creative Content for the campaign
4. Fetch the ASIN list from the response, and then prepend new ASINs in the list
5. Call SymphonyAPI to update the Creative Content for the campaign

Content arguments:



We need to update the `"remote.asinList"` field with new ASINs.

Fetch Symphony Campaign Creative Content:

```
Content getCreativeContent(final UUID creativeId, final Credentials userCredentials) {
    final Response response = symphonyAPIClient.target(userCredentials)
                .path(CONTENT_PATH)
                .resolveTemplate("creativeId", creativeId)
                .request().buildGet().invoke();
    return response.readEntity(Content.class);
}
```

Update Creative with updated content:

```
Content updateCreativeContent(final Content content, final Credentials userCredentials)
    final Response response = symphonyAPIClient.targetPut(content, userCredentials)
                .request()
                .buildPut(Entity.entity(content, ServiceConstants.MEDIA_TYPE_UTF8_APPLI(
                .invoke();
    return response.readEntity(Content.class);
}
```

ASIN List Limit

Cthulhu imposes a limit of showing only top 50 ASINs in a widget. If the “remote.asinList” field in the campaign crosses this limit, only first 50 ASINs in the list will be shown to customers. Confirmed with LR & Merchandising that this is an acceptable behaviour.

Duplicate ASINs

The Symphony campaigns will remain accessible from the WebUI(as it is right now). Merchandising team can update the ASIN order in creative content arguments directly as per needed.

Expected Traffic
Peak: 30 track-ASINs per day(including all languages)
Average: 15 ASINs

SLA
S3 to Lambda Trigger SLA - p99: 1 sec
Lambda Processing SLA - p99: 1 sec
SymphonyAPI GET SLA - p99: 250ms
SymphonyAPI PUT SLA - p99: 1500ms

Estimated Total SLA - 4 sec

IMR
S3 Cost:
1 GB storage per month = $0.00182
Lambda Cost:
512 MB Runtime memory per 1ms cost = $0.0000000083
30 Days x 30 ASINs x 1000 ms x $0.0000000083 = $0.00747 per month
VPC Cost:
NAT Gateways cost = $0.048 per GB Data Processed
3 x 0.5 GB x $0.048 = $0.072 per month

TECH EFFORT

- Setting up S3 Bucket and Lambda - 3 days
- Code changes for fetching ASINs from S3 - 2 days
- Integrating with Symphony client - 3 days
- Code changes for updating ASINs in Symphony - 1 week
- Dev Testing - 2 days

Total Effort: 3 weeks

FAILURE HANDLING

1. If there are any errors in reading the S3 file, a ticket will be cut to LPN tech team.
2. If the SymphonyAPI calls fail, we define retry strategy. After permanent failure, a ticket will be cut.
3. If duplicate ASINs are provided, while fetching the content from Symphony, we can omit them while updating

MONITORING

Business Metrics

1. TAT metric: (Timestamp of Symphony campaign update) - (Timestamp of receiving ASINs from LR)

2. Number of ASINs per language added in widgets
3. Received ASINs from LR and therefore a sense of the gap between ASINs received and ASINs published if any.

Tech Metrics

1. Symphony GetContent success/failure
2. Symphony UpdateContent success/failure
3. Symphony API calls latency
4. S3 file parsing success/failure

Alarms will be associated with each failure metrics.

RESOURCE MIGRATION

Currently all AWS resources will be created in DUB(eu-west-1) region.
In future, we need to migrate both the S3 bucket and Lambda to new AWS region.

PROS & CONS

Pros:

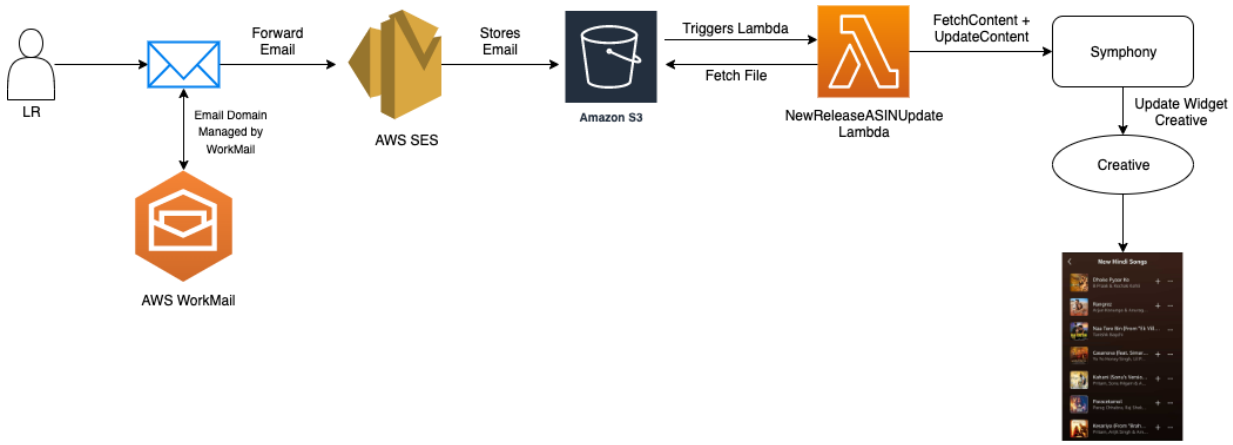
1. Low latency for directly triggering Lambda from S3 bucket upload
2. Limited number of resources need to be created and maintained by LPN
3. Relatively Low AWS cost

Cons:

1. LR team needs to perform 2 additional steps i.e.
   a) Preparing the excel file, b) Uploading the file in S3

Approach 2

We can setup a new email domain to receive emails from LR. Then we can parse email attachment to fetch ASINs and then update widgets.



Link

FETCHING ASIN DETAILS

LPN Setup Steps

Step 1: Register a new domain(e.g. @amazonmusiclpntech.com) in AWS WorkMail for managing emails
Step 2: Setup MX record for the new domain using Route53
Step 3: Setup AWS SES identity with new domain
Step 4: Configuring the WorkMail domain and Route53 record to forward emails to SES identity
Step 5: Configure SES identity rules to upload email content in a S3 bucket
Step 6: Configure S3 bucket to trigger a Lambda function

LR Steps

Step 1:
LR Team creates an excel file, with following details:
Content Language, Track ASIN

The ASINs need to be ordered on the basis of priority(if any).

Content Language	Track ASIN
Punjabi	ABCD123
Punjabi	ABCD456
Marathi	DEFG123
Marathi	DEFG456
Hindi	XYZ123

Step 2:
LR team sends the email with the excel file attached, to an email address in the new domain.
e.g. new-release-lr@amazonmusiclpntech.com.
This email can be combined with the same email LR team sends today.

UPDATING WIDGETS

Once triggered, the Lambda function fetches the email content from S3 bucket.
The email content needs to be parsed to fetch the attachment i.e. the excel file.
Then we need to parse the excel file to collect ASINs and their language.

For the current scenario, we can perform following operations:

1. Collect all the ASINs for a particular language
2. Fetch the Symphony campaign-id for the language
3. Call SymphonyAPI to fetch the Creative Content for the campaign
4. Fetch the ASIN list from the response, and then prepend new ASINs in the list
5. Call SymphonyAPI to update the Creative Content for the campaign

SLA

WorkMail SLA - p99: 180 sec
SES SLA - p99: 600ms
S3 to Lambda Trigger SLA - p99: 1 sec
Lambda Processing SLA - p99: 1 sec
SymphonyAPI GET SLA - p99: 250ms
SymphonyAPI PUT SLA - p99: 1500ms

Estimated Total SLA - 185 sec

IMR

WorkMail cost:
2 users x 4.00 per user per month = 8.00 total monthly charge
Total mailbox cost: 8.00 USD per month
Route53 cost:
Total tier cost = 0.50 USD (Hosted Zone cost)
1 policy record per month x 50.00 USD = 50.00 USD (Traffic Flow cost)
Total cost: 50.50 USD per month
SES usage cost:
1,000 messages per month x 0.0001 USD = 0.10 USD (Messages received cost)
100 KB / 256 chunk size factor = 0.390625 chunk size in 256KB
3 number of IPs x 24.95 USD = 74.85 USD (Dedicated IP addresses cost)
0.10 USD + 74.85 USD = 74.95 USD (SES usage cost)
Total cost: 74.95 USD monthly
S3 Cost:
1 GB storage per month = $0.00182
Lambda Cost:
512 MB Runtime memory per 1ms cost = $0.0000000083
30 Days x 30 ASINs x 1000 ms x $0.0000000083 = $0.00747 per month
VPC Cost:
NAT Gateways cost = $0.048 per GB Data Processed
3 x 0.5 GB x $0.048 = $0.072 per month

TECH EFFORT

- Setting up new Domain in WorkMail and configure in Route53 - 1 week
  1. Creating a hosted zone
  2. Associate VPC with the hosted zone
  3. Create Routing policy
  4. Create DNS records
  5. Create MX records
  6. Create CNAME records
  7. Create Domain using hosted zone
  8. Verifying domain and records
- Setting up and Configuring SES to receive emails and upload in S3 - 1 week
  1. Verify domain with SES
  2. Publish a SES MX record to DNS configuration of domain
  3. Setup email receiving policy
  4. Setup SES action to upload email content to S3 bucket
- Code changes for fetching email content from S3 - 3 days
- Integrating with Symphony client - 3 days
- Code changes for updating ASINs in Symphony - 1 week
- Dev Testing - 3 days

Total Effort: 5 weeks

PROS & CONS

Pros:

1. LR team only needs to perform one additional step i.e. preparing the excel file

Cons:

1. Several new resources need to be set up, configured & maintained by LPN
2. Relatively high AWS cost for owning and managing WorkMail domain and SES
3. Relatively higher latency since Total SLA = WorkMail domain delivery SLA + SES actions SLA + Lambda SLA

Approach 3

We can setup a new webpage and provide functionality to upload files with new ASIN details. The file can then be parsed and used to update widgets.

FETCHING ASIN DETAILS

LPN Setup Steps
Step 1: Configure a S3 bucket to host a static page with Upload Button
Step 2: Configure AWS Cognito to create access configuration for the webpage
Step 3: Implement APIs to create file upload functionality and configure using APIGateway
Step 4: Setup a Lambda and make code changes to store uploaded file content in a S3 bucket
Step 5: Configure S3 bucket to trigger a Lambda function

LR Steps
Step 1:
LR Team creates an excel file, with following details:
Content Language, Track ASIN

The ASINs need to be ordered on the basis of priority(if any).

Content Language	Track ASIN
Punjabi	ABCD123
Punjabi	ABCD456
Marathi	DEFG123
Marathi	DEFG456
Hindi	XYZ123

Step 2:
LR team uploads the excel file on the new webpage.

UPDATING WIDGETS

Once triggered, the Lambda function fetches the uploaded file from S3 bucket.
Then we need to parse the excel file to collect ASINs and their language.

For the current scenario, we can perform following operations:

1. Collect all the ASINs for a particular language
2. Fetch the Symphony campaign-id for the language
3. Call SymphonyAPI to fetch the Creative Content for the campaign
4. Fetch the ASIN list from the response, and then prepend new ASINs in the list

5. Call SymphonyAPI to update the Creative Content for the campaign

TECH EFFORT

- Setup a static webpage using S3 bucket - 1 week
- Setup AWS Cognito to manage access to the webpage - 1 week
- Setup Lambda and create API for File upload - 2 weeks
- Setup API Gateway - 1 week
- Integrating with Symphony client - 1 week
- Code changes for updating ASINs in Symphony - 1 week
- Dev Testing - 1 week

Total Effort: 8 weeks

Comparison

Approach	SLA	Maintenance	Tech Effort	LR Effort	Cost
Approach 1	Low	Low	Low	Mid	Low
Approach 2	Mid	High	Mid	Low	High
Approach 3	Low	High	High	Mid	High

Based on above, we are recommending Approach 1.

Open Questions

1. Does LR+Merchandising team want to get notified for approval each time the symphony content is updated ?
   Ans: No, LR+Merchandising is fine with the ASINs being updated automatically on the widgets.
2. Can the LR team order the ASINs by priority in the excel file ?
   Ans: Yes, LR team will order the ASINs by their desired order on the widgets.