

Gene by Gene API Services

GXG API DEVELOPER GUIDE

V2.2 2022-03-31

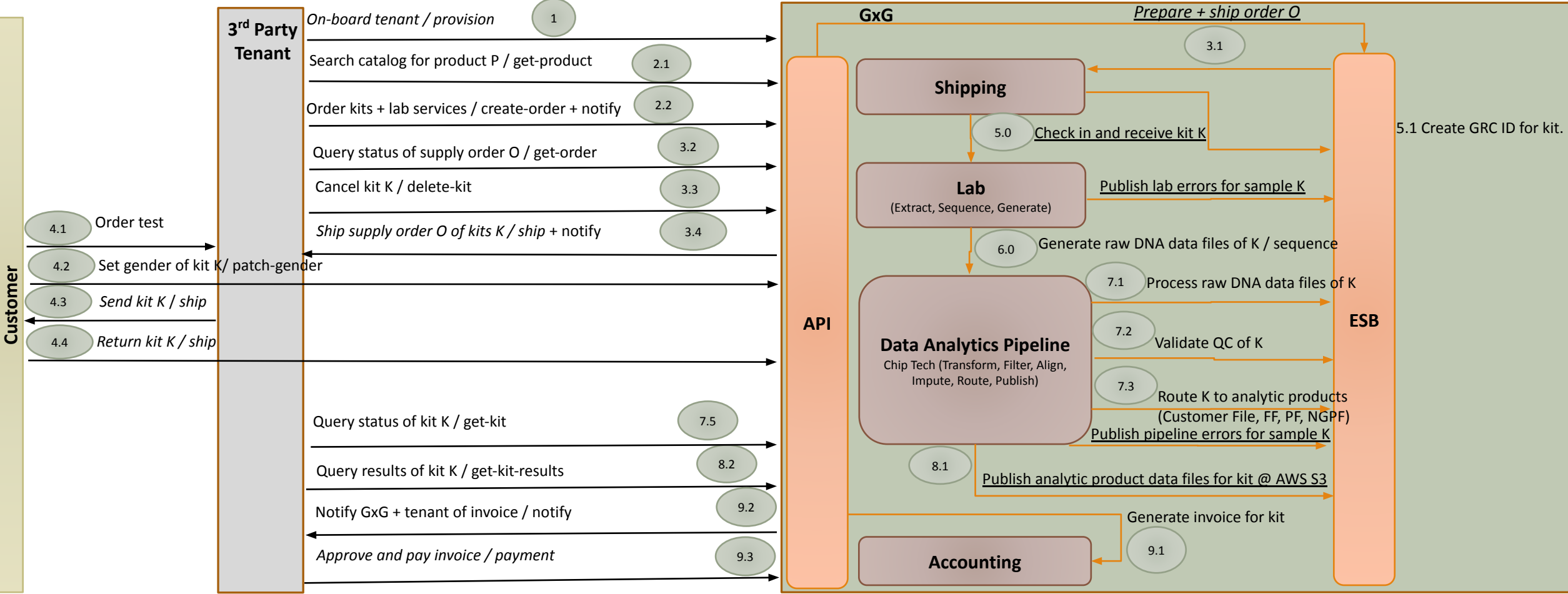
Gene by Gene API Services Overview

- **Purpose:** provide business partners an electronic, programmatic interface to the Gene by Gene ERP technology platform and DNA supply chain.
- **Use Cases**
 - Submit orders for new DNA kit supplies.
 - Order DNA tests and services on behalf of customers.
 - Get status of orders, kits, and tests.
 - Change the gender of kits.
 - Search and manage kits.
 - Get customer results.



- Legend**
- In scope
 - **Out of scope**
 - Topic Event
 - *Offline, Manual*

Gene by Gene API Services Application Architecture



Gene by Gene API Services

Walk Through 1-2

1. Receive **Tenant Credentials** (e.g. Client ID and Password for “ACME Genomics, LLC”).
 - a) Store securely in software system configuration.
 - b) Use and sign-in with credentials for OAuth authorization request. OAuth server grants access tokens for API usage.

2. Search and choose **Product**. Create **Order**.
 - a) Lookup products @ GET /api/v2/products
 - b) Filter response rows by product name or use first one as default. Store `productID` for later .
 - c) Create and submit Order @ POST /api/v2/orders
 - Use `productID` from step 2b and provide desired `quantity` of new kits
 - Or provide `productID` from step2b and specify *existing* kit numbers (e.g. AG123456).
 - POST /api/v2/orders/actions/createOrderForExistingKits
 - You can also optionally specify a `shippingAddressId` and a `deliveryOptionsId`; if unspecified, then these will be defaulted to the primary ones for your tenant.
 - d) Order response will show status of “Pending”, quantity, timestamp, and specified products. Store `orderID` for later.

Gene by Gene API Services Walk Through 3-7

3. Get order status and history. Cancel kit in order.
 - a) Browse all orders @ `GET /api/v2/orders`. Page through response rows using `offset` and `pageSize` parameters.
 - b) View order status details @ `GET /api/v2/orders/{orderId}` and use `orderId` from step 2 or 3a.
 - c) Call `DELETE /api/v2/kits/{kitnumber}/orderLines`.
4. Set kit gender.
 - a) Set kit gender @ `PATCH /api/v2/kits/{kitNumber}/gender/{gender}` and use `kitNumber` and "male" or "female"
7. Get kit status details and history.
 - b) View individual kit status details @ `GET /api/v2/kits/{kitNumber}`
 - c) Browse status of all kits @ `GET /api/v2/kits`. Page through response rows using `offset` and `pageSize` parameters.

Gene by Gene API Services

Walk Through 8

8. Get kit test results.

- a) View kit test result details @ GET /api/v2/kits/{kitNumber}/ or GET /api/v2/kits/{kitNumber}/results
- b) The **resultPayload** property in the API response is a URL *pointing* to a file in AWS S3 bucket secured for your tenancy that you own and maintain.
- c) Note that the **kit_number** property in the result file name is the alphanumeric text representation of the barcode label printed on the GxG vials.
- d) Note that the **sample_uuid** property in the result file is an internal DNA pipeline system GUID and **NOT** Nuclues GUID for that kit.
- e) Significant changes to the prior result file format have been **highlighted** below. Note that the allele result pair has been combined from two fields into one. Also note that the old header containing the kit and product metadata has been removed entirely.

```
s3://gxc-acme-s3-yourbucket/AG12345_GxGGSAv2_2_ACME_35502FA2-0DD9-4F61-8778-65A43A613781.csv
```

Result File Schema

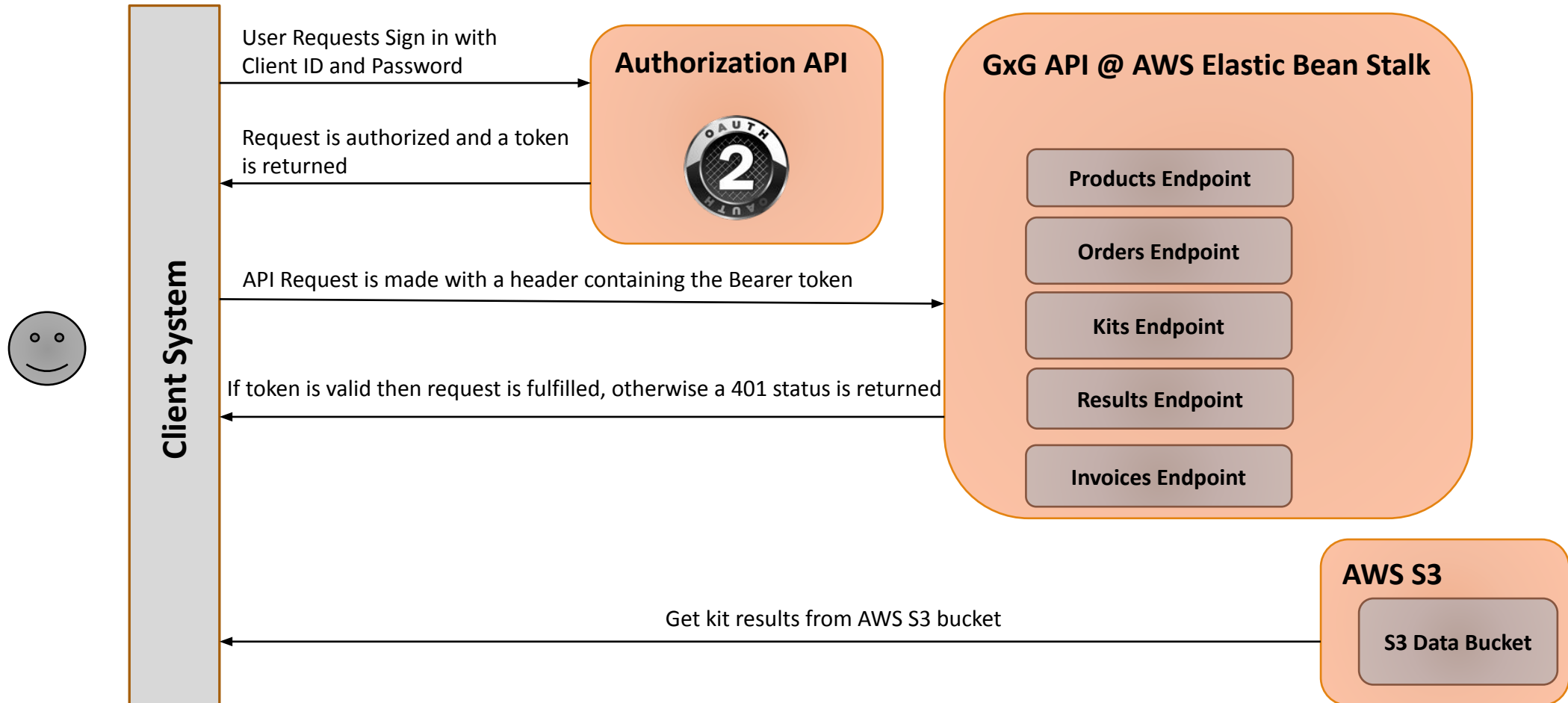
```
RSID, CHROMOSOME, POSITION, RESULT
<snp data row>*
```

```
<snp-data-row> = rsid, chromosome, position, allele1allele2
```

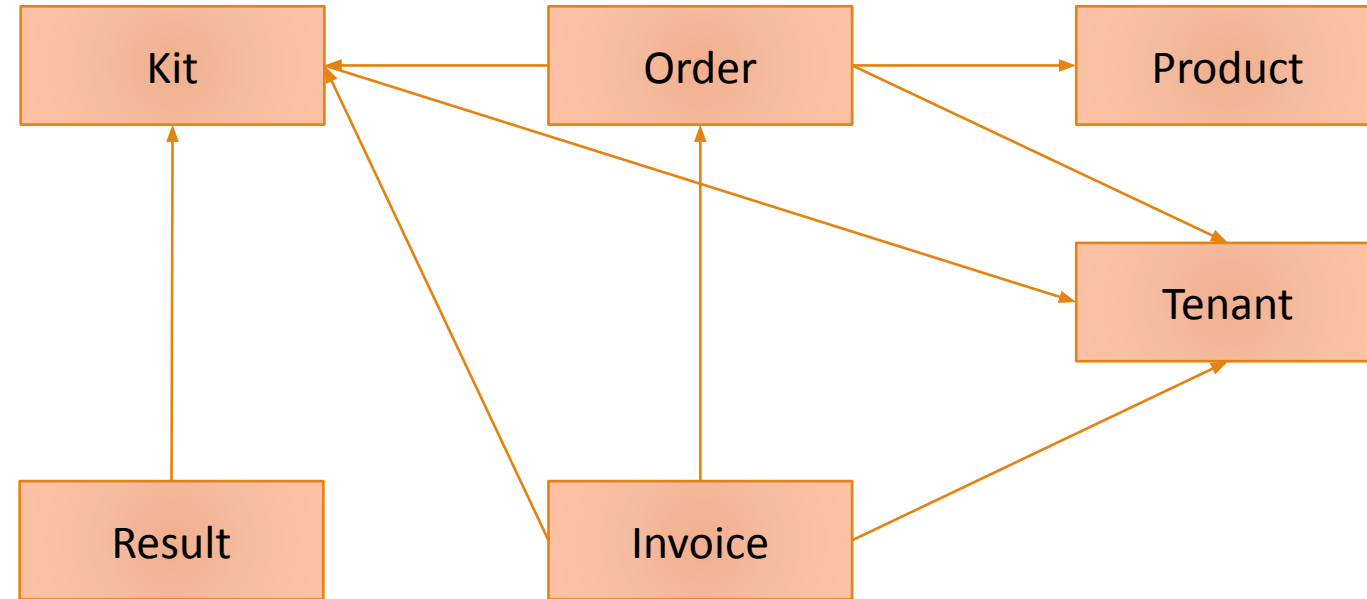
Result File Example: **AG12345** GxGGSAv2_2_ACME_0123456789.csv

```
RSID, CHROMOSOME, POSITION, RESULT
rs10136766, 14, 106232585, GG
rs10774624, 12, 111833788, AA
```

Gene by Gene API Services Platform Architecture



Gene by Gene API Services Data Architecture



Legend
 Product is a material (e.g. tube, swab) or service (e.g. lab activity such as autosomal DNA, yDNA, mtDNA).
 Package is a set of bundled and related products priced for a tenant.
 Order is a set of related line items of kits and products.
 Invoice is a set of related billable order line items.
 Result is a document containing lab test results for a specific kit/product combination.

Gene by Gene API Services Usage

- Use credentials generated for your tenant.
- If using the Swagger doc, then click the Authorize button.
- If making live calls, then an auth token must be generated first.
 - Generate auth token.
 - POST <https://staging-auth.genebygene.com/connect/token>
 - with the following parameters (x-www-form-urlencoded):
 - client_id: <your client id>
 - client_secret: <your client secret>
 - grant_type: client_credentials
 - Use auth token value in subsequent requests
- Authorization = "Bearer <access token value>"

Gene by Gene API Services Workflows

Step	Kit Status	Order Status	Order Type	Invoice Status	Actions	Notifications
1					GxG and customer (tenant partner) on-board: agree on contract terms, integrate system APIs, and provision AWS S3 data bucket.	System notifies all parties (customer, GxG Gene by Gene/LIMS/Accounting/Shipping) when customer is on-boarded.
2	1 – Not Received	Pending			Tenant creates and submits order.	System notifies GxG (Gene by Gene, Accounting) for invoice to be generated.
3		Processing	Materials	Finalized Outstanding	GxG prepares order kits, packages order materials, and ships order to tenant. System notifies Tenant and GxG.	System notifies Shipping once invoice is paid to process /ship materials. GxG updates tracking information for specific order which triggers order status change to Completed.
4					Tenant receives order and uses order materials to sell kits to customers.	
5	2 – Received	Processing	Lab Services (e.g. Family Finder, Medical)	Finalized Outstanding	GxG receives customer kit in shipping, checks in kit, and forwards kit onto Lab. System notifies Tenant and GxG.	System notifies customer and GxG. GxG generates and finalizes invoice for Tenant. GxG sends invoice to Tenant before lab processes kits.
6	3 – In Lab				Lab generates raw data and sends information onto Data Pipeline.	
7	4 – In QC Analysis 5 – QC Analysis Complete 6 – Completed 0 – Error				Data Pipeline analyzes and processes data, validates data Quality Control (QC), and publishes processed results to AWS S3.	
8		Error Completed			Tenant gets kit results.	GxG notifies customer that new results are available.
9				Overdue Paid	Tenant pays for kit results.	Awaiting payment for invoice (if not prepaid).

Gene by Gene API Services Environments

Environment	URL	Details
Demo	API @ https://demo-api.genebygene.com AUTH @ https://demo-auth.genebygene.com WWW @ https://demo-client.genebygene.com	API Client ID: API Client Secret: User ID: User Pwd:
Staging	API @ https://staging-api.genebygene.com AUTH @ https://staging-auth.genebygene.com WWW @ https://staging-client.genebygene.com	API Client ID: Details provided after LSA Execution for Tenant/Product onboarding API Client Secret: Details provided after LSA Execution for Tenant/Product onboarding
Production	API @ https://Gene by Gene-api.genebygene.com (https://api.genebygene.com) AUTH @ https://Gene by Gene-auth.genebygene.com (https://auth.genebygene.com) WWW @ https://client.genebygene.com	As the data producer, GxG is responsible for: <ul style="list-style-type: none"> • Setting up your tenancy in production • Providing Web API credentials for your tenancy • Sending you the credentials securely As the data consumer, you are responsible for: <ul style="list-style-type: none"> • Creating, owning, and maintaining an AWS S3 bucket (e.g. <code>s3://gxxg-xyz</code>) • Granting bucket write permissions to a GxG-owned AWS account (e.g. <code>gxxg_xyz</code>) • Providing GxG the S3 bucket URL, client user name, client access key ID, and client secret.

Gene by Gene API Services FAQ

- How do I get system technical support?
 - Please contact api.support@genebygene.com .
- How do I get business and sales support?
 - Please contact lab.services@genebygene.com .
- Can I set custom Kit numbers?
 - No. Kit numbers are ASCII character strings, the first 2 characters must be uniquely reserved for each tenant, and there are 2 methods for generating the suffix: 1) sequential, or 2) unique random. When your tenancy is provisioned, you will must choose a unique 2 character prefix and a method for specifying the suffix. Example "ACME Genomics, Inc." might choose "AG" as its prefix and the sequential suffix resulting in kit numbers such as "AG1", "AG2", ... "AG123456789".
- GxG Team for Gene by Gene Core API Services Notifications
 - Ashley Jones
 - Caroline Brignac
 - Daniel Au
 - Kelly Jenkins

Gene by Gene API Services FAQ Continued

■ Kit Status

- Error => Damaged Kit, Missing Swabs, Delay, Unusable, Unknown Gender, Missing Consent Form, Male/Female in Lab Marked as F/M (0)
- Not Received (1)
- Received (2)
- In Lab (3)
- In Analysis (4)
- QC/Analysis Complete (5)
- Results Completed (6)

■ HTTP Status

- 200 – OK
- 202 – Accepted
- 400 – Bad Request
- 401 – Unauthorized
- 404 – Not Found
- 500 – Internal Server Error