

GDC API User's Guide

NCI Genomic Data Commons (GDC)

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Chapter 1

Getting Started

Getting Started

The GDC Application Programming Interface (API): An Overview

The GDC API drives the GDC Data and Submission Portals and provides programmatic access to GDC functionality. This includes searching for, downloading, and submitting data and metadata. The GDC API uses JSON as its communication format, and standard HTTP methods like `GET`, `PUT`, `POST` and `DELETE`.

This guide explains how to construct and execute API requests and interpret API responses.

Tools for communicating with the GDC API

Many third-party tools can be used for communicating with the GDC API and for preparing and visualizing API calls.

Examples of tools for communicating with the GDC API:

Tool	Type
Curl	Command line tool
HTTPIe	Command line tool
Postman REST Client	App for Google Chrome and OS X
DHC REST Client	Google Chrome extension
Google Chrome	Google Chrome web browser

Examples of tools that can help build GDC API calls:

Tool	Description
JSONLint	Validate JSON
JSON Formatter	Format, validate, and convert JSON to other formats
Percent-(URL)-encoding tool	Tool for percent-encoding strings
JSON escape tool	Tool for escaping strings using JSON string rules

API Endpoints

Communicating with the GDC API involves making calls to API endpoints. Each GDC API endpoint represents specific API functionality, as summarized in the following table:

Endpoint	Type	Description
status	Status	Get the API status and version information
projects	Search & Retrieval	Search all data generated by a project
cases	Search & Retrieval	Find all files related to a specific case, or sample donor.
files	Search & Retrieval	Find all files with specific characteristics such as file_name, md5sum, data_format and others.
annotations	Search & Retrieval	Search annotations added to data after curation
data	Download	Used to download GDC data
manifest	Download	Generates manifests for use with GDC Data Transfer Tool
slicing	BAM Slicing	Allows remote slicing of BAM format objects
submission	Submission	Returns the available resources at the top level above programs i.e., registered programs

The HTTP URL that corresponds to the latest version of a GDC API endpoint is `https://api.gdc.cancer.gov/<endpoint>`, where `<endpoint>` is the name of the endpoint.

The HTTP URL of an endpoint corresponding to a specific major version of the GDC API is `https://api.gdc.cancer.gov/<version>/<endpoint>` where `<endpoint>` is the name of the endpoint and `<version>` is the GDC API version.

For example, the address of the latest version of the `status` endpoint is `https://api.gdc.cancer.gov/status`, whereas the address of the `status` endpoint corresponding to version 0 of GDC API is `https://api.gdc.cancer.gov/v0/status`.

GDC Legacy Archive

To interact with data in the GDC Legacy Archive, add `legacy` to the endpoint URL:

```
1 https://api.gdc.cancer.gov/<version>/legacy/<endpoint>
```

Entity UUIDs

All objects (*entities*) in the GDC are assigned a unique identifier in the form of a [version 4 universally unique identifier \(UUID\)](#). The UUID uniquely identifies the entity in the GDC, and is stored in the entity's `id` property.

UUIDs are frequently used in GDC API requests and responses to identify specific entities like files, cases, and samples.

See GDC Data Model for details.

Sample Request

The following is an example of a request to the `files` endpoint, which retrieves information about a BAM file stored in the GDC.

```
1 curl https://api.gdc.cancer.gov/files/d853e541-f16a-4345-9f00-88e03c2dc0bc?pretty=true
```

```
““ python import requests import json
```

```
file_endpt = 'https://api.gdc.cancer.gov/files/' file_uuid = 'd853e541-f16a-4345-9f00-88e03c2dc0bc' response = re-  
quests.get(file_endpt + file_uuid) print json.dumps(response.json(), indent=2)
```

```

1 {
2   "data": {
3     "data_type": "Aligned Reads",
4     "updated_datetime": "2016-05-26T17:06:40.003624-05:00",
5     "created_datetime": "2016-05-26T17:06:40.003624-05:00",
6     "file_name": "0017ba4c33a07ba807b29140b0662cb1_gdc_realn.bam",
7     "md5sum": "a08304b120c5df76b6532da0e9a35ced",
8     "data_format": "BAM",
9     "acl": [
10      "phs000178"
11    ],
12     "access": "controlled",
13     "platform": "Illumina",
14     "state": "submitted",
15     "file_id": "d853e541-f16a-4345-9f00-88e03c2dc0bc",
16     "data_category": "Raw Sequencing Data",
17     "file_size": 23650901931,
18     "submitter_id": "c30188d7-be1a-4b43-9a17-e19ccd71792e",
19     "type": "aligned_reads",
20     "file_state": "processed",
21     "experimental_strategy": "WXS"
22   },
23   "warnings": {}
24 }

```

Authentication

Authentication is required for downloading controlled-access data, and for all data submission functionality. The GDC API uses tokens for authentication.

Users can obtain authentication tokens from the [GDC Data Portal](#) and the [GDC Data Submission Portal](#). See the [GDC Data Portal User's Guide](#) and the [GDC Data Submission Portal User's Guide](#) for instructions.

Using Authentication Tokens

All API requests that require authentication must include a token as an **X-Auth-Token** custom HTTP header.

In the following example, an authentication token is saved as an environment variable and passed to `curl` to download a controlled-access file:

```

1 token=$(<gdc-token-text-file.txt)
2
3 curl -O -J -H "X-Auth-Token: $token"
   'https://api.gdc.cancer.gov/data/a1c1b23b-cc41-4e85-b1b7-62a42873c5af'

```

1	% Total	% Received	% Xferd	Average Speed	Time	Time	Time	Current
2				Dload Upload	Total	Spent	Left	Speed
3	100 31.4M	100 31.4M	0 0	290k 0	0:01:50	0:01:50	--:--:--	172k

```

4 curl: Saved to filename
   'ACOLD_p_TCGA_Batch17_SNP_N_GenomeWideSNP_6_A03_466078.tangent.copynumber.data.txt'

```

For more information about authentication tokens, including token expiration and rotation, see [Data Security](#).

NOTE: The authentication token should be kept in a secure location, as it allows access to all data accessible by the associated user account.

Chapter 2

Search and Retrieval

Search and Retrieval

Introducing Search and Retrieval Requests

The GDC API provides endpoints that search and retrieve information stored in the GDC according to the GDC Data Model. The general format of requests to search & retrieval endpoints is described below.

Note: Queries described in this section work for datasets that have been released to the GDC Data Portal. Unreleased data that is in the process of being submitted to GDC cannot be queried using these methods. See [Submission](#) to learn how to query unreleased data using GraphQL.

Components of a Request

A typical search and retrieval API request specifies the following parameters:

- a **filters** parameter, that specifies the search terms for the query
- several parameters that specify the API response, such as:
 - **format** — specifies response format (JSON, TSV, XML)
 - **fields** — specifies the which data elements should be returned in the response, if available
 - **size** — specifies the the maximum number of results to include in the response
 - other parameters are described below.

Requests can be executed using HTTP GET or HTTP POST. GET requests are limited by maximum URL length, so the POST method is recommended for large queries.

Note: Requests for information stored in the GDC Legacy Archive must be directed to **legacy/** endpoints. See [Getting Started](#) for details.

POST Example

The following is an example of an HTTP POST request to the **files** endpoint of the GDC API. It looks for Gene Expression Quantification files associated with specific TCGA cases (represented by TCGA barcodes) and retrieves the associated biospecimen metadata in TSV format.

Request

```
1 curl --request POST --header "Content-Type: application/json" --data @Payload  
  'https://api.gdc.cancer.gov/files' > response.tsv
```

Payload

```
1 {  
2   "filters":{  
3     "op":"and",  
4     "content":[  
5       {  
6         "op":"in",  
7         "content":{  
8           "field":"cases.submitter_id",  
9           "value":[  
10            "TCGA-CK-4948",  
11            "TCGA-D1-A17N",  
12            "TCGA-4V-A9QX",  
13            "TCGA-4V-A9QM"  
14          ]  
15        }  
16      },  
17      {  
18        "op":"=",  
19        "content":{  
20          "field":"files.data_type",  
21          "value":"Gene Expression Quantification"  
22        }  
23      }  
24    ]  
25  },  
26  "format":"tsv",  
27  "fields":"file_id,file_name,cases.submitter_id,cases.case_id,data_category,data_type,cases.samples.tumor_des",  
28  "size":"1000"  
29 }
```

Each component of the request is explained below.

GET Example

The above request can be executed as an HTTP GET:

```
1 https://api.gdc.cancer.gov/files?filters=%7B%22op%22%3A%22and%22%2C%22content%22%3A%5B%7B%22op%22%3A%22in%22%2C%
```

Each component of the request is explained below.

Endpoints

The following search and retrieval endpoints are available in the GDC API:

Endpoints	Description
files	Information about files stored in the GDC
cases	Information related to cases, or sample donors.
projects	Information about projects

Endpoints	Description
annotations	Information about annotations to GDC data
_mapping	Information about elements that can be used to query other endpoints

The choice of endpoint determines what is listed in the search results. The `files` endpoint will generate a list of files, whereas the `cases` endpoint will generate a list of cases. Each of the above endpoints, other than `_mapping`, can query and return any of the related fields in the GDC Data Model. So the `cases` endpoint can be queried for file fields (e.g. to look for cases that have certain types of experimental data), and the `files` endpoint can be queried for clinical metadata associated with a case (e.g. to look for files from cases diagnosed with a specific cancer type).

Project Endpoint

The `projects` endpoint provides access to project records, the highest level of data organization in the GDC.

Example

This example is a query for projects contained in the GDC. It uses the `from`, `size`, `sort`, and `pretty` parameters, and returns the first two projects sorted by project id.

```
1 curl 'https://api.gdc.cancer.gov/projects?from=0&size=2&sort=project.project_id:asc&pretty=true'
```

```
1 {
2   "data": {
3     "hits": [
4       {
5         "dbgap_accession_number": null,
6         "disease_type": [
7           "Brain Lower Grade Glioma"
8         ],
9         "released": true,
10        "state": "legacy",
11        "primary_site": [
12          "Brain"
13        ],
14        "project_id": "TCGA-LGG",
15        "id": "TCGA-LGG",
16        "name": "Brain Lower Grade Glioma"
17      },
18      {
19        "dbgap_accession_number": null,
20        "disease_type": [
21          "Thyroid Carcinoma"
22        ],
23        "released": true,
24        "state": "legacy",
25        "primary_site": [
26          "Thyroid"
27        ],
28        "project_id": "TCGA-THCA",
29        "id": "TCGA-THCA",
30        "name": "Thyroid Carcinoma"
31      }
32    ],
33    "pagination": {
```

```

34     "count": 2,
35     "sort": "project.project_id:asc",
36     "from": 0,
37     "page": 1,
38     "total": 39,
39     "pages": 20,
40     "size": 2
41   }
42 },
43 "warnings": {}
44 }

```

Retrieval of project metadata using project_id

The project endpoint supports a simple query format that retrieves the metadata of a single project using its `project_id`:

```

1 curl 'https://api.gdc.cancer.gov/projects/TARGET-NBL?expand=summary,summary.experimental_strategies,summary.data_

```

```

1 {
2   "data": {
3     "dbgap_accession_number": "phs000467",
4     "disease_type": [
5       "Neuroblastoma"
6     ],
7     "summary": {
8       "data_categories": [
9         {
10          "case_count": 151,
11          "file_count": 471,
12          "data_category": "Transcriptome Profiling"
13        },
14        {
15          "case_count": 1127,
16          "file_count": 3,
17          "data_category": "Biospecimen"
18        },
19        {
20          "case_count": 216,
21          "file_count": 1732,
22          "data_category": "Simple Nucleotide Variation"
23        },
24        {
25          "case_count": 7,
26          "file_count": 1,
27          "data_category": "Clinical"
28        },
29        {
30          "case_count": 270,
31          "file_count": 599,
32          "data_category": "Raw Sequencing Data"
33        }
34      ],
35      "case_count": 1127,
36      "file_count": 2806,
37      "experimental_strategies": [
38        {

```

```

39     "case_count": 221,
40     "file_count": 2174,
41     "experimental_strategy": "WXS"
42 },
43 {
44     "case_count": 151,
45     "file_count": 628,
46     "experimental_strategy": "RNA-Seq"
47 }
48 ],
49 "file_size": 8157614402888
50 },
51 "released": true,
52 "state": "legacy",
53 "primary_site": [
54     "Nervous System"
55 ],
56 "project_id": "TARGET-NBL",
57 "name": "Neuroblastoma"
58 },
59 "warnings": {}
60 }

```

Files Endpoint

The GDC Files Endpoint <https://api.gdc.cancer.gov/files> enables search and retrieval of information relating to files stored in the GDC, including file properties such as `file_name`, `md5sum`, `data_format`, and others.

Example

This example is a query for files contained in the GDC. It uses the `from`, `size`, `sort`, and `pretty` parameters, and returns only the first two files, sorted by file size, from smallest to largest.

```

1 curl 'https://api.gdc.cancer.gov/files?from=0&size=2&sort=file_size:asc&pretty=true'

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "data_type": "Raw Simple Somatic Mutation",
6         "updated_datetime": "2017-03-04T16:45:40.925270-06:00",
7         "file_name": "9f78a291-2d50-472c-8f56-5f8fbd09ab2a.snp.Somatic.hc.vcf.gz",
8         "submitter_id": "TCGA-13-0757-01A-01W-0371-08_TCGA-13-0757-10A-01W-0371-08_varscan",
9         "file_id": "9f78a291-2d50-472c-8f56-5f8fbd09ab2a",
10        "file_size": 1120,
11        "id": "9f78a291-2d50-472c-8f56-5f8fbd09ab2a",
12        "created_datetime": "2016-05-04T14:50:54.560567-05:00",
13        "md5sum": "13c1ceb3519615e2c67128b350365fbf",
14        "data_format": "VCF",
15        "acl": [
16          "phs000178"
17        ],
18        "access": "controlled",
19        "state": "live",
20        "data_category": "Simple Nucleotide Variation",
21        "type": "simple_somatic_mutation",

```



```

22     "file_state": "submitted",
23     "experimental_strategy": "WXS"
24 },
25 {
26     "data_type": "Raw Simple Somatic Mutation",
27     "updated_datetime": "2017-03-04T16:45:40.925270-06:00",
28     "file_name": "7780009b-abb6-460b-903d-accdac626c2e.snp.Somatic.hc.vcf.gz",
29     "submitter_id": "TCGA-HC-8261-01A-11D-2260-08_TCGA-HC-8261-10A-01D-2260-08_varscan",
30     "file_id": "7780009b-abb6-460b-903d-accdac626c2e",
31     "file_size": 1237,
32     "id": "7780009b-abb6-460b-903d-accdac626c2e",
33     "created_datetime": "2016-05-08T13:54:38.369393-05:00",
34     "md5sum": "fd9bb46c8022b96af730c48dc00e2c41",
35     "data_format": "VCF",
36     "acl": [
37         "phs000178"
38     ],
39     "access": "controlled",
40     "state": "live",
41     "data_category": "Simple Nucleotide Variation",
42     "type": "simple_somatic_mutation",
43     "file_state": "submitted",
44     "experimental_strategy": "WXS"
45 }
46 ],
47 "pagination": {
48     "count": 2,
49     "sort": "file_size:asc",
50     "from": 0,
51     "page": 1,
52     "total": 274724,
53     "pages": 137362,
54     "size": 2
55 }
56 },
57 "warnings": {}
58 }

```

Retrieval of file metadata using individual UUIDs:

The `files` endpoint supports a simple query format that retrieves the metadata of a single file using its UUID:

```
1 curl 'https://api.gdc.cancer.gov/files/000225ad-497b-4a8c-967e-a72159c9b3c9?pretty=true'
```

```

1 {
2   "data": {
3     "data_type": "Raw Simple Somatic Mutation",
4     "updated_datetime": "2016-06-04T23:42:25.428738-05:00",
5     "created_datetime": "2016-06-03T19:04:32.950673-05:00",
6     "file_name": "000225ad-497b-4a8c-967e-a72159c9b3c9.snp.Somatic.hc.vcf.gz",
7     "md5sum": "bbe8a7157acbfc9133e47898650b5437",
8     "data_format": "VCF",
9     "acl": [
10        "phs000178"
11    ],
12     "access": "controlled",
13     "state": "submitted",

```

```

14   "file_id": "000225ad-497b-4a8c-967e-a72159c9b3c9",
15   "data_category": "Simple Nucleotide Variation",
16   "file_size": 19690,
17   "submitter_id": "TCGA-VR-A8ET-01A-11D-A403-09_TCGA-VR-A8ET-10B-01D-A403-09_varscan",
18   "type": "simple_somatic_mutation",
19   "file_state": "processed",
20   "experimental_strategy": "WXS"
21 },
22 "warnings": {}
23 }

```

Note: The `file_size` field associated with each file is reported in bytes.

Cases Endpoint

The GDC Cases Endpoint <https://api.gdc.cancer.gov/cases> enables search and retrieval of information related to a specific case.

Note: The `cases` endpoint is designed to retrieve the metadata associated with one or more cases, including all nested biospecimen entities. Filters can be applied to retrieve information for entire cases, but not for lower-level biospecimen entities. For example, a sample within a case cannot be used to query for aliquots that are associated only with that sample. All aliquots associated with the case would be retrieved.

Example

This example is a query for files contained in GDC. It returns case where submitter id is TCGA-BH-AOEA, using the `pretty` and `filters` parameters and the following filtering operators:

```
1 {"op":"and","content":[{"op":"in","content":{"field":"submitter_id","value":["TCGA-BH-AOEA"]}}]}
```

Command:

```

1 curl
   'https://api.gdc.cancer.gov/cases?filters=%7B%22op%22%3A%22and%22%2C%22content%22%3A%5B%7B%22op%22%3A%22in%22%2C%22content%22%3A%5B%7B%22field%22%3A%22submitter_id%22%2C%22value%22%3A%5B%22TCGA-BH-AOEA%22%5D%5D%7D%5D%7D'

1 {
2   {
3     "data": {
4       "hits": [
5         {
6           "updated_datetime": "2017-03-04T16:39:19.244769-06:00",
7           "submitter_analyte_ids": [
8             "TCGA-BH-AOEA-01A-11R",
9             "TCGA-BH-AOEA-10A-01W",
10            "TCGA-BH-AOEA-01A-11W",
11            "TCGA-BH-AOEA-01A-11D",
12            "TCGA-BH-AOEA-10A-01D"
13          ],
14          "analyte_ids": [
15            "fe678556-acf4-4bde-a95e-860bb0150a95",
16            "66ed0f86-5ca5-4dec-ba76-7ee4dcf31831",
17            "f19f408a-815f-43d9-8032-e9482b796371",
18            "69ddc092-88a0-4839-a2bb-9f1c9e760409",
19            "30cb470f-66d4-4085-8c30-83a42e8453d4"
20          ],
21          "submitter_id": "TCGA-BH-AOEA",
22          "case_id": "1f601832-eee3-48fb-acf5-80c4a454f26e",
23          "id": "1f601832-eee3-48fb-acf5-80c4a454f26e",

```

```

"disease_type": "Breast Invasive Carcinoma",
"sample_ids": [
  "9a6c71a6-82cd-42b1-a93f-f569370848d6",
  "7f791228-dd77-4ab0-8227-d784a4c7fea1"
],
"portion_ids": [
  "cb6086d1-3416-4310-b109-e8fa6e8b72d4",
  "8629bf5a-cdaf-4f6a-90bb-27dd4a7565c5",
  "ae4f5816-f97a-4605-9b05-9ab820467dee"
],
"submitter_portion_ids": [
  "TCGA-BH-AOEA-01A-21-A13C-20",
  "TCGA-BH-AOEA-01A-11",
  "TCGA-BH-AOEA-10A-01"
],
"created_datetime": null,
"slide_ids": [
  "90154ea1-6b76-4445-870e-d531d6fa1239",
  "a0826f0d-986a-491b-8c6f-b34f8929f3ee"
],
"state": "live",
"aliquot_ids": [
  "eef9dce1-6ba6-432b-bbe2-53c7dbe64fe7",
  "cde982b7-3b0a-49eb-8710-a599cb0e44c1",
  "b1a3739d-d554-4202-b96f-f25a444e2042",
  "97c64d6a-7dce-4d0f-9cb3-b3e4eb4719c5",
  "561b8777-801a-49ed-a306-e7dafeb044b6",
  "42d050e4-e8ee-4442-b9c0-0ee14706b138",
  "ca71ca96-cbb7-4eab-9487-251dda34e107",
  "cfbd5476-e83a-401d-9f9a-639c73a0e35b",
  "edad5bd3-efe0-4c5f-b05c-2c0c2951c45a",
  "262715e1-835c-4f16-8ee7-6900e26f7cf5",
  "2beb34c4-d493-4a73-b21e-de77d43251ff",
  "bcb7fc6d-60a0-48b7-aa81-14c0dda72d76"
],
"primary_site": "Breast",
"submitter_aliquot_ids": [
  "TCGA-BH-AOEA-10A-01D-A113-01",
  "TCGA-BH-AOEA-01A-11R-A115-07",
  "TCGA-BH-AOEA-01A-11D-A10Y-09",
  "TCGA-BH-AOEA-01A-11D-A314-09",
  "TCGA-BH-AOEA-01A-11R-A114-13",
  "TCGA-BH-AOEA-01A-11D-A111-01",
  "TCGA-BH-AOEA-01A-11D-A112-05",
  "TCGA-BH-AOEA-01A-11D-A10X-02",
  "TCGA-BH-AOEA-10A-01D-A110-09",
  "TCGA-BH-AOEA-10A-01W-A12U-09",
  "TCGA-BH-AOEA-10A-01D-A10Z-02",
  "TCGA-BH-AOEA-01A-11W-A12T-09"
],
"submitter_sample_ids": [
  "TCGA-BH-AOEA-10A",
  "TCGA-BH-AOEA-01A"
],
"submitter_slide_ids": [
  "TCGA-BH-AOEA-01A-01-MSA",
  "TCGA-BH-AOEA-01A-01-TSA"
]

```

```

82     }
83   ],
84   "pagination": {
85     "count": 1,
86     "sort": "",
87     "from": 0,
88     "page": 1,
89     "total": 1,
90     "pages": 1,
91     "size": 10
92   }
93 },
94 "warnings": {}
95 }

```

Retrieval of case metadata using individual UUIDs:

The `cases` endpoint supports a simple query format that retrieves the metadata of a single case using its UUID:

```
1 curl 'https://api.gdc.cancer.gov/cases/1f601832-eee3-48fb-acf5-80c4a454f26e?pretty=true&expand=diagnoses'
```

```

1 {
2   "data": {
3     "diagnoses": [
4       {
5         "classification_of_tumor": "not reported",
6         "last_known_disease_status": "not reported",
7         "updated_datetime": "2016-05-16T10:59:16.740358-05:00",
8         "primary_diagnosis": "c50.9",
9         "submitter_id": "TCGA-BH-A0EA_diagnosis",
10        "tumor_stage": "stage iia",
11        "age_at_diagnosis": 26548.0,
12        "vital_status": "dead",
13        "morphology": "8500/3",
14        "days_to_death": 991.0,
15        "days_to_last_known_disease_status": null,
16        "days_to_last_follow_up": null,
17        "state": null,
18        "days_to_recurrence": null,
19        "diagnosis_id": "84654ad5-2a2c-5c3b-8340-ecac6a5550fe",
20        "tumor_grade": "not reported",
21        "tissue_or_organ_of_origin": "c50.9",
22        "days_to_birth": -26548.0,
23        "progression_or_recurrence": "not reported",
24        "prior_malignancy": "not reported",
25        "site_of_resection_or_biopsy": "c50.9",
26        "created_datetime": null
27      }
28    ],
29    "sample_ids": [
30      "7f791228-dd77-4ab0-8227-d784a4c7fea1",
31      "9a6c71a6-82cd-42b1-a93f-f569370848d6"
32    ],
33    "portion_ids": [
34      "cb6086d1-3416-4310-b109-e8fa6e8b72d4",
35      "8629bf5a-cdaf-4f6a-90bb-27dd4a7565c5",
36      "ae4f5816-f97a-4605-9b05-9ab820467dee"

```

```

37 ],
38 "submitter_portion_ids": [
39     "TCGA-BH-AOEA-01A-11",
40     "TCGA-BH-AOEA-01A-21-A13C-20",
41     "TCGA-BH-AOEA-10A-01"
42 ],
43 "created_datetime": null,
44 "submitter_aliquot_ids": [
45     "TCGA-BH-AOEA-01A-11R-A114-13",
46     "TCGA-BH-AOEA-01A-11D-A111-01",
47     "TCGA-BH-AOEA-01A-11W-A12T-09",
48     "TCGA-BH-AOEA-01A-11R-A114-13",
49     "TCGA-BH-AOEA-01A-11R-A115-07",
50     "TCGA-BH-AOEA-01A-11D-A111-01",
51     "TCGA-BH-AOEA-01A-11D-A314-09",
52     "TCGA-BH-AOEA-01A-11D-A112-05",
53     "TCGA-BH-AOEA-01A-11D-A10Y-09",
54     "TCGA-BH-AOEA-01A-11D-A10X-02",
55     "TCGA-BH-AOEA-01A-11W-A12T-09",
56     "TCGA-BH-AOEA-01A-11D-A10X-02",
57     "TCGA-BH-AOEA-01A-11D-A10Y-09",
58     "TCGA-BH-AOEA-01A-11D-A314-09",
59     "TCGA-BH-AOEA-01A-11R-A115-07",
60     "TCGA-BH-AOEA-01A-11D-A112-05",
61     "TCGA-BH-AOEA-10A-01D-A110-09",
62     "TCGA-BH-AOEA-10A-01D-A113-01",
63     "TCGA-BH-AOEA-10A-01W-A12U-09",
64     "TCGA-BH-AOEA-10A-01D-A10Z-02",
65     "TCGA-BH-AOEA-10A-01D-A113-01",
66     "TCGA-BH-AOEA-10A-01D-A110-09",
67     "TCGA-BH-AOEA-10A-01W-A12U-09",
68     "TCGA-BH-AOEA-10A-01D-A10Z-02"
69 ],
70 "updated_datetime": "2016-05-02T14:37:43.619198-05:00",
71 "submitter_analyte_ids": [
72     "TCGA-BH-AOEA-01A-11R",
73     "TCGA-BH-AOEA-01A-11D",
74     "TCGA-BH-AOEA-01A-11W",
75     "TCGA-BH-AOEA-10A-01W",
76     "TCGA-BH-AOEA-10A-01D"
77 ],
78 "analyte_ids": [
79     "30cb470f-66d4-4085-8c30-83a42e8453d4",
80     "66ed0f86-5ca5-4dec-ba76-7ee4dcf31831",
81     "f19f408a-815f-43d9-8032-e9482b796371",
82     "69ddc092-88a0-4839-a2bb-9f1c9e760409",
83     "fe678556-acf4-4bde-a95e-860bb0150a95"
84 ],
85 "submitter_id": "TCGA-BH-AOEA",
86 "case_id": "1f601832-eee3-48fb-acf5-80c4a454f26e",
87 "state": null,
88 "aliquot_ids": [
89     "bcb7fc6d-60a0-48b7-aa81-14c0dda72d76",
90     "97c64d6a-7dce-4d0f-9cb3-b3e4eb4719c5",
91     "edad5bd3-efe0-4c5f-b05c-2c0c2951c45a",
92     "bcb7fc6d-60a0-48b7-aa81-14c0dda72d76",
93     "ca71ca96-cbb7-4eab-9487-251dda34e107",
94     "97c64d6a-7dce-4d0f-9cb3-b3e4eb4719c5",

```

```

95     "eef9dce1-6ba6-432b-bbe2-53c7dbe64fe7",
96     "42d050e4-e8ee-4442-b9c0-0ee14706b138",
97     "561b8777-801a-49ed-a306-e7dafeb044b6",
98     "262715e1-835c-4f16-8ee7-6900e26f7cf5",
99     "edad5bd3-efe0-4c5f-b05c-2c0c2951c45a",
100    "262715e1-835c-4f16-8ee7-6900e26f7cf5",
101    "561b8777-801a-49ed-a306-e7dafeb044b6",
102    "eef9dce1-6ba6-432b-bbe2-53c7dbe64fe7",
103    "ca71ca96-cbb7-4eab-9487-251dda34e107",
104    "42d050e4-e8ee-4442-b9c0-0ee14706b138",
105    "cfbd5476-e83a-401d-9f9a-639c73a0e35b",
106    "2beb34c4-d493-4a73-b21e-de77d43251ff",
107    "b1a3739d-d554-4202-b96f-f25a444e2042",
108    "cde982b7-3b0a-49eb-8710-a599cb0e44c1",
109    "2beb34c4-d493-4a73-b21e-de77d43251ff",
110    "cfbd5476-e83a-401d-9f9a-639c73a0e35b",
111    "b1a3739d-d554-4202-b96f-f25a444e2042",
112    "cde982b7-3b0a-49eb-8710-a599cb0e44c1"
113 ],
114 "slide_ids": [
115     "90154ea1-6b76-4445-870e-d531d6fa1239",
116     "a0826f0d-986a-491b-8c6f-b34f8929f3ee"
117 ],
118 "submitter_sample_ids": [
119     "TCGA-BH-AOEA-01A",
120     "TCGA-BH-AOEA-10A"
121 ]
122 },
123 "warnings": {}
124 }

```

Annotations Endpoint

The GDC Annotation Endpoint <https://api.gdc.cancer.gov/annotations> enables search and retrieval of annotations stored in the GDC.

Example

This example is a query for any annotations **directly** associated with the following GDC entities:

- the case with UUID e0d36cc0-652c-4224-bb10-09d15c7bd8f1
- the sample with UUID 25ebc29a-7598-4ae4-ba7f-618d448882cc
- the aliquot with UUID fe660d7c-2746-4b50-ab93-b2ed99960553

The query uses the `filters` parameter to specify entity UUIDs. Code samples below include the bare and percent-encoded filter JSON.

```

1 {
2   "op": "in",
3   "content": {
4     "field": "entity_id",
5     "value": [
6       "e0d36cc0-652c-4224-bb10-09d15c7bd8f1",
7       "25ebc29a-7598-4ae4-ba7f-618d448882cc",
8       "fe660d7c-2746-4b50-ab93-b2ed99960553"
9     ]

```

```

10 }
11 }

1 %7B%22op%22%3A%22in%22%2C%22content%22%3A%7B%22field%22%3A%22entity_id%22%2C%22value%22%3A%5B%22e0d36cc0-652c-42

1 curl
  'https://api.gdc.cancer.gov/annotations?filters=%7B%22op%22%3A%22in%22%2C%22content%22%3A%7B%22field%22%3A%22

1 {
2   "data": {
3     "hits": [
4       {
5         "category": "Item flagged DNU",
6         "status": "Approved",
7         "entity_id": "fe660d7c-2746-4b50-ab93-b2ed99960553",
8         "classification": "CenterNotification",
9         "entity_type": "aliquot",
10        "created_datetime": "2015-09-28T00:00:00",
11        "annotation_id": "5ddadefe-8b57-5ce2-b8b2-918d63d99a59",
12        "notes": "The aliquot failed Broad pipeline QC and not all files are suitable for use. Consult
           the SDRF file to determine which files are usable.",
13        "updated_datetime": "2017-03-09T13:20:38.962182-06:00",
14        "submitter_id": "29087",
15        "state": "submitted",
16        "case_id": "41b59716-116f-4942-8b63-409870a87e26",
17        "case_submitter_id": "TCGA-DK-A3IM",
18        "entity_submitter_id": "TCGA-DK-A3IM-10A-01D-A20B-01",
19        "id": "5ddadefe-8b57-5ce2-b8b2-918d63d99a59"
20      },
21      {
22        "category": "Item is noncanonical",
23        "status": "Approved",
24        "entity_id": "25ebc29a-7598-4ae4-ba7f-618d448882cc",
25        "classification": "Notification",
26        "entity_type": "sample",
27        "created_datetime": "2012-07-12T00:00:00",
28        "annotation_id": "d6500f94-618f-5334-a810-ade76b887ec9",
29        "notes": "No Matching Normal",
30        "updated_datetime": "2017-03-09T13:47:18.182075-06:00",
31        "submitter_id": "8009",
32        "state": "submitted",
33        "case_id": "bd114e05-5a97-41e2-a0d5-5d39a1e9d461",
34        "case_submitter_id": "TCGA-08-0514",
35        "entity_submitter_id": "TCGA-08-0514-01A",
36        "id": "d6500f94-618f-5334-a810-ade76b887ec9"
37      },
38      {
39        "category": "Prior malignancy",
40        "status": "Approved",
41        "entity_id": "e0d36cc0-652c-4224-bb10-09d15c7bd8f1",
42        "classification": "Notification",
43        "entity_type": "case",
44        "created_datetime": "2013-03-12T00:00:00",
45        "annotation_id": "33336cdf-2cf0-5af2-bb52-fecd3427f180",
46        "notes": "Patient had a prior lymphoma. Unknown radiation or systemic chemotherapy.",
47        "updated_datetime": "2017-03-09T12:11:31.786013-06:00",
48        "submitter_id": "15630",
49        "state": "submitted",

```

```

50     "case_id": "e0d36cc0-652c-4224-bb10-09d15c7bd8f1",
51     "case_submitter_id": "TCGA-FS-A1ZF",
52     "entity_submitter_id": "TCGA-FS-A1ZF",
53     "id": "33336cdf-2cf0-5af2-bb52-fecd3427f180"
54 }
55 ],
56 "pagination": {
57     "count": 3,
58     "sort": "",
59     "from": 0,
60     "page": 1,
61     "total": 3,
62     "pages": 1,
63     "size": 10
64 }
65 },
66 "warnings": {}
67 }

```

__mapping Endpoint

Each search and retrieval endpoint is equipped with a `_mapping` endpoint that provides information about available fields. For example, `files/_mapping` endpoint provides information about fields and field groups available at the `files` endpoint: https://api.gdc.cancer.gov/files/_mapping.

The high-level structure of a response to a `_mapping` query is as follows:

```

1 "_mapping": {}
2 , "defaults": []
3 , "expand": []
4 , "fields": []
5 , "multi": []
6 , "nested": []

```

Each part of the response is described below:

Part	Description
<code>_mapping</code>	All available fields and their descriptions. The endpoint-agnostic field names provided here are compatible with the <code>filters</code> parameter but are not always compatible with the <code>fields</code> parameter
<code>defaults</code>	The default set of fields included in the API response when the <code>fields</code> parameter is not used in the request
<code>expand</code>	Field group names for use with the <code>expand</code> parameter
<code>fields</code>	All available fields in an endpoint-specific format that is compatible with both the <code>filters</code> and <code>fields</code> parameters
<code>multi</code>	GDC internal use
<code>nested</code>	Nested fields

Example

```

1 curl 'https://api.gdc.cancer.gov/projects/_mapping'
2
3 {
4     ...
5 }

```



```

4     "_mapping": {
5       "projects.disease_type": {
6         "doc_type": "projects",
7         "field": "disease_type",
8         "type": "id"
9       },
10      "projects.name": {
11        "doc_type": "projects",
12        "field": "name",
13        "type": "id"
14      }
15    }
16
17    ...
18
19  }

```

Similar information can be obtained using the **fields** parameter; **fields** queries provide additional information in the response, such as the name of the Elastic Search document (**doc_type**), the field name and the type of value. A list of supported types (such as **string**, **long**, **float**, ...) can be obtained from [Elastic Search Documentation](#).

Request Parameters

The GDC API supports the following search & retrieval request parameters:

Parameter	Default	Description
filters	null	Specifies search parameters
format	JSON	Specifies the API response format: JSON, XML, or TSV
pretty	false	Returns response with indentations and line breaks in a human-readable format
fields	null	Specifies which fields to include in the response
expand	null	Returns multiple related fields
size	10	Specifies the number of results to return
from	0	Specifies the first record to return from a set of search results
sort	null	Specifies sorting for the search results
facets	null	Provides all existing values for a given field and the number of records having this value.

Filters: Specifying the Query

The **filters** parameter enables passing of complex search queries to the GDC API. The parameter carries a query in the form of a JSON object.

Query Format

A **filters** query consists of an operator (or a nested set of operators) with a set of **field** and **value** operands.

The following **filters** query operators are supported by the GDC API:

Operator	Description	Number of Operands	Logic example
=	equals (string or number)	one	gender = "female"

Operator	Description	Number of Operands	Logic example
!=	does not equal (string or number)	one	project_id != "TARGET-AML"
<	less than (number)	one	age at diagnosis < 90y
<=	less than or equal (number)	one	age at diagnosis <= 17
>	greater than (number)	one	age at diagnosis > 50
>=	greater than or equal (number)	one	age at diagnosis >= 18
is	is (missing)	one	gender is missing
not	not (missing)	one	race not missing
in	matches a string or number in (a list)	multiple	primary_site in [Brain, Lung]
exclude	does not match any strings or values in (a list)	multiple	experimental_strategy exclude [WXS, WGS, "Genotyping array"]
and	(operation1) and (operation2)	multiple	{primary_site in [Brain, Lung]} and {gender = "female"}
or	(operation1) or (operation2)	multiple	{project_id != "TARGET-AML"} or {age at diagnosis < 90y}

The **field** operand specifies a field that corresponds to a property defined in the GDC Data Dictionary. A list of supported fields is provided in Appendix A; the list can also be accessed programmatically at the `_mapping` endpoint.

The **value** operand specifies the search terms. Users can get a list of available values for a specific property by making a call to the appropriate API endpoint using the **facets** parameter, e.g. <https://api.gdc.cancer.gov/v0/cases?facets=demographic.gender&size=100>. See [Facets](#) for details.

A simple query with a single operator looks like this:

```

1 {
2   "op": "=",
3   "content": {
4     "field": "cases.demographic.gender",
5     "value": [
6       "male"
7     ]
8   }
9 }
```

A more complex query with multiple operators looks like this:

```

1 {
2   "op": "and",
3   "content": [
4     {
5       "op": "in",
6       "content": {
7         "field": "cases.submitter_id",
8         "value": [
9           "TCGA-CK-4948",
10          "TCGA-D1-A17N",
11          "TCGA-4V-A9QX",
12          "TCGA-4V-A9QM"
13        ]
14      }
15    },
```

```

16     {
17         "op": "=",
18         "content": {
19             "field": "files.data_type",
20             "value": "Gene Expression Quantification"
21         }
22     }
23 ]
24 }

```

Example: HTTP GET Request

This example requests `male` cases using HTTP GET.

The JSON object to be passed to the GDC API looks like:

```

1 {"op": "=",
2   "content": {
3       "field": "cases.demographic.gender",
4       "value": ["male"]
5   }
6 }

```

URL-encoding the above JSON object using [Percent-\(URL\)-encoding tool](#) results in the following string:

```

1 %7b%22op%22%3a+%22%3d%22%2c%0d%0a+++++%22content%22%3a+%7b%0d%0a++++++%22field%22%3a+%22cases.clinical.gend

```

The above string can now be passed to the GDC API using the `filters` parameter:

```

1 curl
   'https://api.gdc.cancer.gov/cases?filters=%7b%22op%22%3a+%22%3d%22%2c%0d%0a+++++%22content%22%3a+%7b%0d%0a

```

```

1 import requests
2 import json
3 cases_endpt = 'https://api.gdc.cancer.gov/cases'
4 filt = {"op": "=",
5         "content": {
6             "field": "cases.demographic.gender",
7             "value": ["male"]
8         }
9 }
10 params = {'filters': json.dumps(filt), 'sort': 'demographic.gender:asc'}
11 ## requests URL-encodes automatically
12 response = requests.get(cases_endpt, params = params)
13 print json.dumps(response.json(), indent=2)

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "sample_ids": [
6             "1d014bf1-95ae-42e3-ae39-97ff4841d8ca",
7             "6b685bfc-651b-48d1-8e68-32c8096ea205"
8         ],
9         "portion_ids": [
10             "c061217a-266a-496d-8a96-3489191afa87",
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385     "243f24ba-bb0f-44e0-bcb1-69a97b395981",
386     "6cae9f2a-1c6c-4645-98b6-20719aec1413",
387     "44d020d1-c516-4a15-94e8-bcf0cb9c2683"
388 ],
389 "slide_ids": [
390     "0ff02899-57f8-419e-8872-c6ede53f4d3c"
391 ],
392 "submitter_sample_ids": [
393     "TCGA-VQ-A922-10A",
394     "TCGA-VQ-A922-01A"
395 ]
396 },
397 {
398     "sample_ids": [
399         "5bb5bd60-cf47-413b-88fa-f14977e24035",
400         "82fcf670-1646-4a28-9578-f7e5b2f426e5",
401         "3b87fed0-cfbd-4ee3-b71d-ab595853e836"
402     ],
403     "portion_ids": [
404         "18bf160e-702a-464a-9920-f115024b5484",
405         "10a9c093-009d-4bc0-a344-2afd3f0f9b9f",
406         "8ebd06e1-5eda-47ec-8888-61965ecf005e"
407     ],
408     "submitter_portion_ids": [
409         "TCGA-HU-8243-11A-01",
410         "TCGA-HU-8243-01A-11",
411         "TCGA-HU-8243-10A-01"
412     ],
413     "created_datetime": "2016-05-02T16:17:09.754748-05:00",
414     "submitter_aliquot_ids": [
415         "TCGA-HU-8243-01A-01D-YYYY-23",
416         "TCGA-HU-8243-01A-11D-2340-08",
417         "TCGA-HU-8243-01A-11D-2338-01",
418         "TCGA-HU-8243-01A-11D-2342-05",
419         "TCGA-HU-8243-11A-01D-2338-01",

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420     "TCGA-HU-8243-11A-01D-2340-08",
421     "TCGA-HU-8243-10A-01D-2339-01",
422     "TCGA-HU-8243-01A-11R-2343-13",
423     "TCGA-HU-8243-10A-01D-2341-08"
424 ],
425 "updated_datetime": "2016-05-02T16:17:09.754748-05:00",
426 "submitter_analyte_ids": [
427     "TCGA-HU-8243-11A-01D",
428     "TCGA-HU-8243-10A-01D",
429     "TCGA-HU-8243-01A-11R",
430     "TCGA-HU-8243-01A-11D"
431 ],
432 "analyte_ids": [
433     "89c9094d-5cf6-4c7d-ad24-41b7ad9427cc",
434     "2c413e60-0122-426b-afb3-ae94810e2513",
435     "57d41760-0fed-49d2-8606-48231cb244ea",
436     "37ed51fd-b540-408e-8bd6-4447ae4aa84a"
437 ],
438 "submitter_id": "TCGA-HU-8243",
439 "case_id": "77a8eab6-f6a1-4739-9031-75ead40d68cb",
440 "state": null,
441 "aliquot_ids": [
442     "ace3edd6-14a9-42cc-84f3-6127237f2913",
443     "a711abd1-f1c2-4e42-8b66-79b4514ac1c4",
444     "6af7ba34-58f7-4472-8c7e-89fc91ad5ac1",
445     "558ff67a-a584-46f8-9089-8f4a08015294",
446     "71c0a224-5953-4b59-a49c-b7aa1e959f1e",
447     "a460c222-bcac-4959-961f-4dbd73e1ce13",
448     "6e5789d7-4988-457a-86eb-e618c7ab06eb",
449     "ff31f56b-398c-45ee-b122-f10027774527",
450     "9635cf4d-3d26-4fc6-846c-fd74d5b60098"
451 ],
452 "slide_ids": [
453     "60b7c6b8-594a-40c3-9341-a0902e4e6938",
454     "e55e00a0-2048-404a-b83a-f34106468694"
455 ],
456 "submitter_sample_ids": [
457     "TCGA-HU-8243-10A",
458     "TCGA-HU-8243-01A",
459     "TCGA-HU-8243-11A"
460 ]
461 },
462 {
463     "sample_ids": [
464         "2f5cc9c9-31a9-5eb3-952a-b21e7cef50ca",
465         "4f3f4fc8-4465-5230-83ec-c0ef6aceb2ea"
466     ],
467     "updated_datetime": "2016-05-25T19:12:45.610324-05:00",
468     "submitter_aliquot_ids": [
469         "TARGET-30-PAUXFZ-01A-01D",
470         "TARGET-30-PAUXFZ-10A-01D"
471     ],
472     "submitter_id": "TARGET-30-PAUXFZ",
473     "case_id": "a7ccef7c-14c0-5232-b647-58b4a54fb343",
474     "aliquot_ids": [
475         "9e1e30a8-7607-5b7e-b33c-9a6c5828d5fb",
476         "c56898f9-c394-516a-bdbb-bf32a5af9d3f"
477     ],

```

```

478     "submitter_sample_ids": [
479         "TARGET-30-PAUXFZ-01A",
480         "TARGET-30-PAUXFZ-10A"
481     ]
482 },
483 {
484     "sample_ids": [
485         "c1bcb8d1-e13d-4af4-93f4-02d5f7f616a2",
486         "52fcf737-cdcc-43ea-b33c-4018039b42dd"
487     ],
488     "portion_ids": [
489         "e0e97a05-656a-468e-8418-0d08c38e76ab",
490         "3e2a0eab-7d89-4f3c-9c0e-8942e53d3c45"
491     ],
492     "submitter_portion_ids": [
493         "TCGA-KK-A8I9-01A-11",
494         "TCGA-KK-A8I9-11A-11"
495     ],
496     "created_datetime": null,
497     "submitter_aliquot_ids": [
498         "TCGA-KK-A8I9-11A-11D-A361-01",
499         "TCGA-KK-A8I9-11A-11D-A362-08",
500         "TCGA-KK-A8I9-11A-11W-A446-08",
501         "TCGA-KK-A8I9-01A-11R-A36G-07",
502         "TCGA-KK-A8I9-11A-11D-A40C-01",
503         "TCGA-KK-A8I9-01A-11D-A363-01",
504         "TCGA-KK-A8I9-01A-11W-A447-08",
505         "TCGA-KK-A8I9-01A-11D-A365-05",
506         "TCGA-KK-A8I9-01A-11D-A364-08",
507         "TCGA-KK-A8I9-01A-11R-A36B-13"
508     ],
509     "updated_datetime": "2016-05-02T15:57:29.451686-05:00",
510     "submitter_analyte_ids": [
511         "TCGA-KK-A8I9-11A-11W",
512         "TCGA-KK-A8I9-01A-11R",
513         "TCGA-KK-A8I9-11A-11D",
514         "TCGA-KK-A8I9-01A-11W",
515         "TCGA-KK-A8I9-01A-11D"
516     ],
517     "analyte_ids": [
518         "ddec19cb-5e4c-4151-8b6d-741044abff1e",
519         "96c5b539-8eb7-4156-81d0-7b7fec68900",
520         "ced38a45-7610-49d4-8bf9-d53a1fc2d489",
521         "476f5deb-1b3f-4a35-8a31-f27763ba8d8a",
522         "c284f2af-1e9b-40cc-8936-b61cfd251d62"
523     ],
524     "submitter_id": "TCGA-KK-A8I9",
525     "case_id": "261c3d74-706e-4751-bd15-8f3c1a402ff0",
526     "state": null,
527     "aliquot_ids": [
528         "4f76de2d-e07a-402b-9818-7f04d3704a43",
529         "96802a73-b1db-47d7-8f5f-4504f3ece5ad",
530         "f376fc45-370a-4d96-833b-9a1322e32a42",
531         "d3e88dd3-66d7-40d4-978a-4ddab868373a",
532         "06f1d087-75c9-4da8-8339-80aff3bfaa12",
533         "50b1e243-b45a-42a1-8692-b7ae5d51250f",
534         "0f1c00d3-f3dc-4d2b-bd8a-ecc31e4f4089",
535         "986a3ed6-ba56-4025-a2bd-9909648e703a",

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```

536     "bebc84b6-9179-420b-8207-858b999e8c0c",
537     "239d5e7e-5fb5-4df3-ae6b-a5a06ee296ae"
538 ],
539 "slide_ids": [
540     "1e174ca5-9298-41b6-a705-728f111a3e7b",
541     "a3e31324-9e06-4799-85b4-4f6236848009"
542 ],
543 "submitter_sample_ids": [
544     "TCGA-KK-A8I9-11A",
545     "TCGA-KK-A8I9-01A"
546 ]
547 },
548 {
549     "sample_ids": [
550         "d43f727a-96d6-40b8-86ae-7a3e0aa46853",
551         "b8329a6d-a87b-47f4-ad00-9e979e62647b"
552 ],
553     "portion_ids": [
554         "8960ddcc-0950-4d6e-a557-8727b652c93b",
555         "e36bfd07-c911-4a98-8424-e58e5e9aaa68"
556 ],
557     "submitter_portion_ids": [
558         "TCGA-QR-A70H-10A-01",
559         "TCGA-QR-A70H-01A-12"
560 ],
561     "created_datetime": null,
562     "submitter_aliquot_ids": [
563         "TCGA-QR-A70H-01A-12R-A35K-07",
564         "TCGA-QR-A70H-01A-12R-A35M-13",
565         "TCGA-QR-A70H-01A-12D-A35E-05",
566         "TCGA-QR-A70H-10A-01D-A35A-01",
567         "TCGA-QR-A70H-01A-12D-A35C-01",
568         "TCGA-QR-A70H-01A-12W-A43Z-08",
569         "TCGA-QR-A70H-10A-01D-A35B-08",
570         "TCGA-QR-A70H-10A-01W-A441-08",
571         "TCGA-QR-A70H-01A-12D-A35D-08"
572 ],
573     "updated_datetime": "2016-05-02T15:37:31.996088-05:00",
574     "submitter_analyte_ids": [
575         "TCGA-QR-A70H-10A-01D",
576         "TCGA-QR-A70H-10A-01W",
577         "TCGA-QR-A70H-01A-12D",
578         "TCGA-QR-A70H-01A-12W",
579         "TCGA-QR-A70H-01A-12R"
580 ],
581     "analyte_ids": [
582         "c4a41555-dd45-4e10-a3be-50d49a1121a3",
583         "957e01f6-eb3f-446e-9f45-b50c66337e2d",
584         "1acde950-2e0c-4586-852b-b4ac4e1ea4a4",
585         "67c033c0-9fe8-4004-967e-c605e1890f4d",
586         "b0873010-5d60-4691-b700-e172950f1d7c"
587 ],
588     "submitter_id": "TCGA-QR-A70H",
589     "case_id": "13b41b15-a785-4ab7-b864-ffff6d35dd45",
590     "state": null,
591     "aliquot_ids": [
592         "d9120f00-7f10-49d5-ae84-6177e9424c7c",
593         "31c6fa50-200a-46c1-a546-61b52592fd8f",

```

```

594     "ab50f38c-2e7d-4d75-a216-27aeaa4d9305",
595     "382d5e31-6c66-4df3-a695-6b8c29cfc681",
596     "51d1fb14-c918-4439-b816-ef6cd3253c64",
597     "f586d8d5-d0c6-4979-aaa7-10217a88fa4c",
598     "2f9a60eb-602e-44bb-bc57-87e20d946f76",
599     "fbafc85e-deff-46cd-a40f-479b9dc92a60",
600     "cacbc8a6-0eb0-4277-931f-d0075c9b1de9"
601 ],
602 "slide_ids": [
603     "2310e34c-0ea5-4876-9f87-bad0b7a44513"
604 ],
605 "submitter_sample_ids": [
606     "TCGA-QR-A70H-01A",
607     "TCGA-QR-A70H-10A"
608 ]
609 },
610 {
611     "sample_ids": [
612         "19dee039-9c98-4d4a-8baf-eea1b6dda8eb",
613         "fdf1e501-f34f-450c-9a5c-611157079a86"
614     ],
615     "portion_ids": [
616         "10b6ccb4-3637-4769-8988-417c0306eaeef",
617         "92f8cd48-451d-4ed6-8e60-b15aa93d2c09",
618         "d0d55efa-c91d-45de-92bf-cf6f0d263b21"
619     ],
620     "submitter_portion_ids": [
621         "TCGA-BJ-A18Z-01A-21",
622         "TCGA-BJ-A18Z-01A-11-A21L-20",
623         "TCGA-BJ-A18Z-10A-01"
624     ],
625     "created_datetime": null,
626     "submitter_aliquot_ids": [
627         "TCGA-BJ-A18Z-01A-21D-A13U-02",
628         "TCGA-BJ-A18Z-10A-01D-A13V-01",
629         "TCGA-BJ-A18Z-01A-21R-A13Y-07",
630         "TCGA-BJ-A18Z-01A-21W-A14T-08",
631         "TCGA-BJ-A18Z-01A-21D-A13Z-05",
632         "TCGA-BJ-A18Z-01A-21D-A37T-08",
633         "TCGA-BJ-A18Z-10A-01D-A13W-08",
634         "TCGA-BJ-A18Z-01A-21R-A13X-13",
635         "TCGA-BJ-A18Z-01A-21D-A13W-08",
636         "TCGA-BJ-A18Z-10A-01D-A13U-02",
637         "TCGA-BJ-A18Z-10A-01W-A14T-08",
638         "TCGA-BJ-A18Z-01A-21D-A13V-01"
639     ],
640     "updated_datetime": "2016-05-02T16:18:19.199189-05:00",
641     "submitter_analyte_ids": [
642         "TCGA-BJ-A18Z-01A-21W",
643         "TCGA-BJ-A18Z-01A-21D",
644         "TCGA-BJ-A18Z-01A-21R",
645         "TCGA-BJ-A18Z-10A-01D",
646         "TCGA-BJ-A18Z-10A-01W"
647     ],
648     "analyte_ids": [
649         "119ebfa1-75b2-4f24-816a-4e9a5061f6b5",
650         "f86759fd-ecc5-4f42-b5fe-b9f079d23968",
651         "39691042-bd28-40ed-b66b-26414ecf1ba0",

```

```

652     "76ea5056-d7fa-49fb-94bf-11171ca7c100",
653     "71a822c9-b510-4a4c-8c30-18b8083acc2d"
654 ],
655 "submitter_id": "TCGA-BJ-A18Z",
656 "case_id": "0d497faf-2c1c-4173-a5fe-770cca73323c",
657 "state": null,
658 "aliquot_ids": [
659     "fa580596-e70f-4ed0-85a2-6fb594ca679a",
660     "776cb4b1-8efd-4ea2-b53f-9dff7dd94b10",
661     "85a7922f-0327-437c-bdf5-1bb67a1e932f",
662     "6d532180-0175-4610-8bfa-cca3a7c3697a",
663     "b5977e73-49d8-4e99-9e97-993cc44dad17",
664     "918793fa-b35e-4745-ac75-4d1c868089f8",
665     "ba9479a1-929f-4e4e-8bf5-e23cb280dfcf",
666     "e9776ff5-69b9-4669-ab33-e4bb030461ec",
667     "8ba98907-ab03-4c9e-a900-e31aa16ff810",
668     "35e18649-183e-4223-b2f6-d812bdd9becd",
669     "4aa17671-4420-4989-a6dd-379250f4aeda",
670     "815c53c3-8add-4612-b93c-3ed4bfa530aa"
671 ],
672 "slide_ids": [
673     "7c5b5c77-9fbc-4b48-81f5-48b5ede7c436"
674 ],
675 "submitter_sample_ids": [
676     "TCGA-BJ-A18Z-01A",
677     "TCGA-BJ-A18Z-10A"
678 ]
679 }
680 ],
681 "pagination": {
682     "count": 10,
683     "sort": "",
684     "from": 0,
685     "page": 1,
686     "total": 6340,
687     "pages": 634,
688     "size": 10
689 }
690 },
691 "warnings": {}
692 }

```

Example: HTTP POST Request

This example demonstrates how to obtain metadata in TSV format for a set of files using their UUIDs (e.g. UUIDs obtained from a [download manifest file generated by the GDC Data Portal](#)).

The first step is to construct a JSON query object, including **filters**, **fields**, **format**, and **size** parameters. The object is then submitted as HTTP POST payload to the GDC API using curl, in order to retrieve a TSV file with the requested metadata.

```

1 {
2     "filters":{
3         "op":"in",
4         "content":{
5             "field":"files.file_id",
6             "value":[
7                 "0001801b-54b0-4551-8d7a-d66fb59429bf",
8                 "002c67f2-ff52-4246-9d65-a3f69df6789e",

```

```

9         "003143c8-bbbf-46b9-a96f-f58530f4bb82",
10        "0043d981-3c6b-463f-b512-ab1d076d3e62",
11        "004e2a2c-1acc-4873-9379-ef1aa12283b6",
12        "005239a8-2e63-4ff1-9cd4-714f81837a61",
13        "006b8839-31e5-4697-b912-8e3f4124dd15",
14        "006ce9a8-cf38-462e-bb99-7f08499244ab",
15        "007ce9b5-3268-441e-9ffd-b40d1127a319",
16        "0084a614-780b-42ec-b85f-7a1b83128cd3",
17        "00a5e471-a79f-4d56-8a4c-4847ac037400",
18        "00ab2b5a-b59e-4ec9-b297-76f74ffd3fb",
19        "00c5f14e-a398-4076-95d1-25f320ee3a37",
20        "00c74a8b-10aa-40cc-991e-3365ea1f3fce",
21        "00df5a50-bce3-4edf-a078-641e54800dcb"
22    ]
23 }
24 },
25 "format":"TSV",
26 "fields":"file_id,file_name,cases.submitter_id,cases.case_id,data_category,data_type,cases.samples.tumor_descriptor",
27 "size":"100"
28 }

```

```

1 curl --request POST --header "Content-Type: application/json" --data @Payload.txt
  'https://api.gdc.cancer.gov/files' > File_metadata.txt

```

cases_0_submitter_id	cases_0_case_id	data_type	cases_0_samples_0_sample_type	cases_0_samples_0_tissue_type	file_name	cases_0_samples_0_submitter_id	cases_0_samples_0_portions_0_analytes_0_aliquots_0_aliquot_id	cases_0_samples_0_sample_id	file_id	data_category	cases_0_samples_0_tumor_descriptor	cases_0_samples_0_portions_0_analytes_0_aliquots_0_submitter_id
TCGA-B0-5094	8aaa4e25-5c12-4ace-96dc-91aaa0c4457c	Aligned Reads	Solid Tissue Normal	C345.TCGA-B0-5094-11A-01D-1421-08.5_gdc_realn.bam	TCGA-B0-5094-11A	b4e4630a-b38c-4b62-b0e8-d73f0e3b4e47	7519d7a8-c3ee-417b-9cfc-111bc5ad0637	0001801b-54b0-4551-8d7a-d66fb59429bf	Raw Sequencing Data	TCGA-B0-5094-11A-01D-1421-08		
TCGA-B0-5117	ae55b2d3-62a1-419e-9f9a-5ddfacc356db4	Aligned Reads	Solid Tissue Normal	C345.TCGA-B0-5117-11A-01D-1421-08.5_gdc_realn.bam	TCGA-B0-5117-11A	45c68b6b-0bed-424d-9a77-4f87bbbaa3649	b1116541-bece-4df3-b3dd-cec50aeb277b	003143c8-bbbf-46b9-a96f-f58530f4bb82	Raw Sequencing Data	TCGA-B0-5117-11A-01D-1421-08		
TCGA-G7-6790	e7a1cbe2-793c-4747-8412-8be794f2382b	Aligned Reads	Blood Derived Normal	C489.TCGA-G7-6790-10A-01D-1962-08.2_gdc_realn.bam	TCGA-G7-6790-10A	66cbb40f-14b3-40c0-a332-e8a8e21bca11	4be83d0f-8b09-4e9e-8318-358371d34332	004e2a2c-1acc-4873-9379-ef1aa12283b6	Raw Sequencing Data	TCGA-G7-6790-10A-01D-1962-08		
TCGA-B9-A69E	a4225cb2-7b4b-4122-b6b9-629c26e3ea56	Aligned Reads	Blood Derived Normal	TCGA-B9-A69E-10A-01D-A31X-10_Illumina_gdc_realn.bam	TCGA-B9-A69E-10A	f4799bdc-b207-4053-9a4b-5a26ebf8ab91	5d6d6cd4-6a7b-499d-936a-1be9bf74b07f	0084a614-780b-42ec-b85f-7a1b83128cd3	Raw Sequencing Data	TCGA-B9-A69E-10A-01D-A31X-10		
TCGA-EE-A2GU	24faa36a-268d-4a13-b3ae-eacd431a2bcc	Aligned Reads	Blood Derived Normal	C828.TCGA-EE-A2GU-10A-01D-A198-08.2_gdc_realn.bam	TCGA-EE-A2GU-10A	c3feacc2-5a26-4bb2-a312-8b2ee53ccad1	cc4a5ed8-376a-4842-a25d-ffb07d8e1ca0	00c74a8b-10aa-40cc-991e-3365ea1f3fce	Raw Sequencing Data	TCGA-EE-A2GU-10A-01D-A198-08		
TCGA-CE-A484	e62a728d-390f-428a-bea1-fc8c9814fb11	Aligned Reads	Blood Derived Normal	C499.TCGA-CE-A484-10A-01D-A23U-08.3_gdc_realn.bam	TCGA-CE-A484-10A	641a0220-6eec-434a-b606-e256113b65da	27a8008e-044a-4966-b518-cc6905e292ca	00df5a50-bce3-4edf-a078-641e54800dcb	Raw Sequencing Data	TCGA-CE-A484-10A-01D-A23U-08		
TCGA-DA-A1IB	8fc9cc74-f388-49f0-b957-debb62638634	Aligned Reads	Blood Derived Normal	C828.TCGA-DA-A1IB-10A-01D-A198-08.2_gdc_realn.bam	TCGA-DA-A1IB-10A	30919a1a-df9f-4604-835e-f66ac7bcacdf	432952c5-6505-4220-a581-f65270a45281	00ab2b5a-b59e-4ec9-b297-76f74ffd1d3fb	Raw Sequencing Data	TCGA-DA-A1IB-10A-01D-A198-08		
TCGA-AX-A2HG	7a2cf5ce-8317-4fff-946e-b9937afab815	Aligned Reads	Blood Derived Normal									


```

6c2a8ea343da8d6cc0fd2043492f16df_gdc_realn.bam TCGA-AX-A2HG-10A
8c34ffe2-9012-4b4a-b610-a42a9c6a9780 ef4b80ec-b453-48ec-8ad8-ccac83e1e4db
00c5f14e-a398-4076-95d1-25f320ee3a37 Raw Sequencing Data TCGA-AX-A2HG-10A-01D-A17D-09
10 TCGA-EC-A24G b5c1e511-baf2-45b3-9919-110e8941e3c2 Aligned Reads Blood Derived Normal
671333b193812fc2bd2744053b383459_gdc_realn.bam TCGA-EC-A24G-10A
2a8cb8fe-b64f-453e-8139-7ede12f3fc51 61cf2e54-1b8d-40a0-9c73-a7449cbd570a
00a5e471-a79f-4d56-8a4c-4847ac037400 Raw Sequencing Data TCGA-EC-A24G-10A-01D-A16D-09
11 TCGA-B5-AOK0 29c8f468-5ac1-4d6c-8376-e36e6d246926 Aligned Reads Blood Derived Normal
TCGA-B5-AOK0-10A-01W-A062-09_IlluminaGA-DNASeq_exome_gdc_realn.bam TCGA-B5-AOK0-10A
02e65074-ffda-4795-b8f5-1bfd20bd1019 1df69e2e-f392-465f-8e61-4671ba2fcd35
007ce9b5-3268-441e-9ffd-b40d1127a319 Raw Sequencing Data TCGA-B5-AOK0-10A-01W-A062-09
12 TCGA-C8-A27B f0d8a1fe-e313-44f1-99cc-b965cbeeff0e Aligned Reads Blood Derived Normal
3c99d98ea8eb6acbf819e67fc77623d9_gdc_realn.bam TCGA-C8-A27B-10A
922226ba-6244-4953-ad42-f4daa474c288 31139082-7978-45aa-9d8f-ac4789ac5cec
006b8839-31e5-4697-b912-8e3f4124dd15 Raw Sequencing Data TCGA-C8-A27B-10A-01D-A167-09
13 TCGA-E9-A295 fec0da58-1047-44d2-b6d1-c18cceed43dc Aligned Reads Blood Derived Normal
fd4421a6bbf3efd4e3d5c17fdd610314_gdc_realn.bam TCGA-E9-A295-10A
cd761feb-9a20-4495-8943-c6243532a5cf e74183e1-f0b4-412a-8dac-a62d404add78
002c67f2-ff52-4246-9d65-a3f69df6789e Raw Sequencing Data TCGA-E9-A295-10A-01D-A16D-09
14 TCGA-EB-A440 c787c4da-c564-44f1-89eb-dd9da107acb1 Aligned Reads Blood Derived Normal
C828.TCGA-EB-A440-10A-01D-A250-08.3_gdc_realn.bam TCGA-EB-A440-10A
c723584a-c404-4c88-bfea-e40f5dbba542 5b738547-1825-4684-81bd-864bf2eb43ef
006ce9a8-cf38-462e-bb99-7f08499244ab Raw Sequencing Data TCGA-EB-A440-10A-01D-A250-08
15 TCGA-A2-A3XX 53886143-c1c6-40e9-88e6-e4e5e0271fc8 Aligned Reads Blood Derived Normal
b40998d4778f18ed80d6dd8bff0eb761_gdc_realn.bam TCGA-A2-A3XX-10A
e96d5811-4736-40dd-966d-e0e172aeb0af c6eb6218-ad71-40a6-88b7-a4f1a015b816
0043d981-3c6b-463f-b512-ab1d076d3e62 Raw Sequencing Data TCGA-A2-A3XX-10A-01D-A23C-09
16 TCGA-EB-A3XB a9255dcb-b236-4777-ac43-555e3a5386c3 Aligned Reads Blood Derived Normal
C828.TCGA-EB-A3XB-10B-01D-A23B-08.1_gdc_realn.bam TCGA-EB-A3XB-10B
9f4ffc2f-d006-4d86-b3b1-b25020481893 0e1d4c7c-204d-4765-b090-68ed4cd83835
005239a8-2e63-4ff1-9cd4-714f81837a61 Raw Sequencing Data TCGA-EB-A3XB-10B-01D-A23B-08

```

Format

Specifies the format of the API response: JSON (default), TSV or XML.

Examples

```
1 curl 'https://api.gdc.cancer.gov/cases?fields=submitter_id&size=5&format=TSV'
```

```

1 import requests
2
3 cases_endpt = 'https://api.gdc.cancer.gov/cases'
4 params = {'fields': 'submitter_id',
5           'format': 'TSV'}
6 response = requests.get(cases_endpt, params = params)
7 print response.content

```

```

1 submitter_id
2 TCGA-RC-A6M6
3 TCGA-B6-AORV
4 TCGA-MB-A5Y8
5 TCGA-BQ-5876
6 TCGA-Z6-A9VB

```

```
1 curl 'https://api.gdc.cancer.gov/cases?fields=submitter_id&size=5&format=XML&pretty=true'
```

```

1 import requests
2
3 cases_endpt = 'https://api.gdc.cancer.gov/cases'
4 params = {'fields': 'submitter_id',
5           'format': 'XML',
6           'pretty': 'true'}
7 response = requests.get(cases_endpt, params = params)
8 print response.content

```

```

1 <?xml version="1.0" ?>
2 <response>
3   <data>
4     <hits>
5       <item>
6         <submitter_id>TCGA-MQ-A4LV</submitter_id>
7       </item>
8       <item>
9         <submitter_id>TCGA-N9-A4Q1</submitter_id>
10      </item>
11      <item>
12        <submitter_id>TCGA-78-7154</submitter_id>
13      </item>
14      <item>
15        <submitter_id>TCGA-S7-A7WX</submitter_id>
16      </item>
17      <item>
18        <submitter_id>TCGA-XF-AAML</submitter_id>
19      </item>
20    </hits>
21    <pagination>
22      <count>5</count>
23      <sort/>
24      <from>0</from>
25      <pages>2811</pages>
26      <total>14052</total>
27      <page>1</page>
28      <size>5</size>
29    </pagination>
30  </data>
31  <warnings/>
32 </response>

```

Pretty

Returns when the `pretty` parameter is set to `true`, the API response is formatted with additional whitespace to improve legibility.

Example

```

1 curl 'https://api.gdc.cancer.gov/cases?fields=submitter_id&sort=submitter_id:asc&size=5'

```

```

1 {"data": {"hits": [{"id": "f7af65fc-97e3-52ce-aa2c-b707650e747b", "submitter_id": "TARGET-00-NAAEMA"},
  {"id": "513d0a2a-3c94-5a36-97a4-24c3656fc66e", "submitter_id": "TARGET-00-NAAEMB"}, {"id":
  "b5f20676-727b-50b0-9b5a-582cd8572d6d", "submitter_id": "TARGET-00-NAAEMC"}, {"id":
  "0c0b183f-0d4a-5a9d-9888-0617cebcc462", "submitter_id": "TARGET-20-PABGKN"}, {"id":
  "0f5ed7a7-226d-57bc-a4ce-8a6b18560c55", "submitter_id": "TARGET-20-PABHET"}], "pagination": {"count":
  5, "sort": "submitter_id:asc", "from": 0, "page": 1, "total": 14551, "pages": 2911, "size": 5}},
  "warnings": {}}

```

```
1 curl 'https://api.gdc.cancer.gov/cases?fields=submitter_id&sort=submitter_id:asc&size=5&pretty=true'
```

```
1 {
2   "data": {
3     "hits": [
4       {
5         "id": "f7af65fc-97e3-52ce-aa2c-b707650e747b",
6         "submitter_id": "TARGET-00-NAAEMA"
7       },
8       {
9         "id": "513d0a2a-3c94-5a36-97a4-24c3656fc66e",
10        "submitter_id": "TARGET-00-NAAEMB"
11      },
12      {
13        "id": "b5f20676-727b-50b0-9b5a-582cd8572d6d",
14        "submitter_id": "TARGET-00-NAAEMC"
15      },
16      {
17        "id": "0c0b183f-0d4a-5a9d-9888-0617cebcc462",
18        "submitter_id": "TARGET-20-PABGKN"
19      },
20      {
21        "id": "0f5ed7a7-226d-57bc-a4ce-8a6b18560c55",
22        "submitter_id": "TARGET-20-PABHET"
23      }
24    ],
25    "pagination": {
26      "count": 5,
27      "sort": "submitter_id:asc",
28      "from": 0,
29      "page": 1,
30      "total": 14551,
31      "pages": 2911,
32      "size": 5
33    }
34  },
35  "warnings": {}
36 }
```

Fields

This query parameter specifies which fields are to be included in the API response. The fields in the API response will be unordered. A listing of available fields for each endpoint is provided in Appendix A.

Example

The following example requests case submitter ID, file UUID, file name and file size from the `files` endpoint.

```
1 curl 'https://api.gdc.cancer.gov/files?fields=cases.submitter_id,file_id,file_name,file_size&pretty=true'
```

```
1 import requests
2 import json
3
4 files_endpt = 'https://api.gdc.cancer.gov/files'
5 params = {'fields': 'cases.submitter_id,file_id,file_name,file_size'}
6 response = requests.get(files_endpt, params = params)
7 print json.dumps(response.json(), indent=2)
```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "file_name": "NARKY_p_TCGAb69_SNP_N_GenomeWideSNP_6_H03_697832.grch38.seg.txt",
6         "cases": [
7           {
8             "submitter_id": "TCGA-BP-4989"
9           }
10        ],
11        "file_id": "3bd4d5dc-563a-481c-87a6-ec0017d0d58a",
12        "file_size": 54200
13      },
14      {
15        "file_name": "652ecf99-1af9-41fc-b0a5-d3e5c07a7b5d.FPKM.txt.gz",
16        "cases": [
17          {
18            "submitter_id": "TCGA-60-2709"
19          }
20        ],
21        "file_id": "b3286166-01f9-4149-81b5-a2ea5f27c50e",
22        "file_size": 530665
23      },
24      {
25        "file_name": "CUSKS_p_TCGAb47_SNP_1N_GenomeWideSNP_6_D05_628212.nocnv_grch38.seg.txt",
26        "cases": [
27          {
28            "submitter_id": "TCGA-A8-A07Z"
29          }
30        ],
31        "file_id": "282cc9d1-c5e9-49ff-b27b-e00c1e5529c6",
32        "file_size": 15806
33      },
34      {
35        "file_name": "REEDY_p_TCGAb65_SNP_N_GenomeWideSNP_6_F01_697686.nocnv_grch38.seg.txt",
36        "cases": [
37          {
38            "submitter_id": "TCGA-CJ-4871"
39          }
40        ],
41        "file_id": "fe44a644-eefc-42c5-aac7-a216bc1e88e1",
42        "file_size": 6179
43      },
44      {
45        "file_name": "84df7a8fee9fedb5e8e22849ec66d294_gdc_realn.bam",
46        "cases": [
47          {
48            "submitter_id": "TCGA-A2-A0C0"
49          }
50        ],
51        "file_id": "acd0ec73-c1fe-463e-912c-84e8416510e5",
52        "file_size": 1554555724
53      },
54      {
55        "file_name": "ed8c4bb6-891a-4cf2-80ba-42c5594760d0.vcf",
56        "cases": [
57          {
58            "submitter_id": "TCGA-BQ-7059"

```

```

59     }
60 ],
61     "file_id": "ed8c4bb6-891a-4cf2-80ba-42c5594760d0",
62     "file_size": 264694
63 },
64 {
65     "file_name": "nationwidechildrens.org_clinical.TCGA-IG-A6QS.xml",
66     "cases": [
67         {
68             "submitter_id": "TCGA-IG-A6QS"
69         }
70     ],
71     "file_id": "fe8cf009-f033-4536-95c7-836adcba5bf3",
72     "file_size": 36996
73 },
74 {
75     "file_name": "05f6f9f7-6fb7-4c95-b79c-fdfaba16539d.vep.reheader.vcf.gz",
76     "cases": [
77         {
78             "submitter_id": "TCGA-DK-A3IV"
79         }
80     ],
81     "file_id": "05f6f9f7-6fb7-4c95-b79c-fdfaba16539d",
82     "file_size": 415044
83 },
84 {
85     "file_name": "C484.TCGA-12-5301-01A-01D-1486-08.7_gdc_realn.bam",
86     "cases": [
87         {
88             "submitter_id": "TCGA-12-5301"
89         }
90     ],
91     "file_id": "3b0293c2-4a26-428c-b097-9489f23a2a2d",
92     "file_size": 23661175335
93 },
94 {
95     "file_name": "75a36e71-400d-46a5-93b0-7813cf0595ea.FPKM.txt.gz",
96     "cases": [
97         {
98             "submitter_id": "TCGA-BF-A5E0"
99         }
100     ],
101     "file_id": "28f763c7-8064-4151-ae0e-31e70cd9bfe8",
102     "file_size": 488422
103 }
104 ],
105 "pagination": {
106     "count": 10,
107     "sort": "",
108     "from": 0,
109     "page": 1,
110     "total": 216435,
111     "pages": 21644,
112     "size": 10
113 }
114 },
115 "warnings": {}
116 }

```

Expand

The **expand** parameter provides a shortcut to request multiple related fields (field groups) in the response. Instead of specifying each field using the **fields** parameter, users can specify a field group name using the **expand** parameter to request all fields in the group. Available field groups are listed in [Appendix A](#); the list can also be accessed programmatically at the `__mapping` endpoint. The **fields** and **expand** parameters can be used together to request custom combinations of field groups and individual fields.

Example

```
1 curl
   'https://api.gdc.cancer.gov/files/ac2ddebd-5e5e-4aea-a430-5a87c6d9c878?expand=cases.samples&pretty=true'

1 {
2   "data": {
3     "data_type": "Aligned Reads",
4     "updated_datetime": "2016-09-18T04:25:13.163601-05:00",
5     "created_datetime": "2016-05-26T18:55:53.506549-05:00",
6     "file_name": "000aa811c15656604161e8f0e3a0aae4_gdc_realn.bam",
7     "md5sum": "200475f5f6e42520204e5f6aadfe954f",
8     "data_format": "BAM",
9     "acl": [
10      "phs000178"
11    ],
12     "access": "controlled",
13     "platform": "Illumina",
14     "state": "submitted",
15     "file_id": "ac2ddebd-5e5e-4aea-a430-5a87c6d9c878",
16     "data_category": "Raw Sequencing Data",
17     "file_size": 12667634731,
18     "cases": [
19       {
20         "samples": [
21           {
22             "sample_type_id": "11",
23             "updated_datetime": "2016-09-08T11:00:45.021005-05:00",
24             "time_between_excision_and_freezing": null,
25             "oct_embedded": "false",
26             "tumor_code_id": null,
27             "submitter_id": "TCGA-QQ-A5VA-11A",
28             "intermediate_dimension": null,
29             "sample_id": "b4e7558d-898e-4d68-a897-381edde0bbcc",
30             "is_ffpe": false,
31             "pathology_report_uuid": null,
32             "created_datetime": null,
33             "tumor_descriptor": null,
34             "sample_type": "Solid Tissue Normal",
35             "state": null,
36             "current_weight": null,
37             "composition": null,
38             "time_between_clamping_and_freezing": null,
39             "shortest_dimension": null,
40             "tumor_code": null,
41             "tissue_type": null,
42             "days_to_sample_procurement": null,
43             "freezing_method": null,
44             "preservation_method": null,
45             "days_to_collection": 5980,
```

```

46         "initial_weight": 810.0,
47         "longest_dimension": null
48     }
49 ]
50 }
51 ],
52 "submitter_id": "32872121-d38a-4128-b96a-698a6f18f29d",
53 "type": "aligned_reads",
54 "file_state": "processed",
55 "experimental_strategy": "WXS"
56 },
57 "warnings": {}
58 }

```

Size and From

GDC API provides a pagination feature that limits the number of results returned by the API. It is implemented using **size** and **from** query parameters.

The **size** query parameter specifies the maximum number of results to return. Default **size** is 10. If the number of query results is greater than **size**, only some of the results will be returned.

The **from** query parameter specifies the first record to return out of the set of results. For example, if there are 20 cases returned from the **cases** endpoint, then setting **from** to 11 will return results 12 to 20. The **from** parameter can be used in conjunction with the **size** parameter to return a specific subset of results.

Example

```
1 curl 'https://api.gdc.cancer.gov/files?fields=file_name&from=0&size=2&pretty=true'
```

```

1 import requests
2 import json
3
4 files_endpt = 'https://api.gdc.cancer.gov/files'
5 params = {'fields': 'file_name',
6           'from': 0, 'size': 2}
7 response = requests.get(files_endpt, params = params)
8 print json.dumps(response.json(), indent=2)

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "file_name":
6           "unc.edu.276a1e00-cf3a-4463-a97b-d544381219ea.2363081.rsem.isoforms.normalized_results"
7       },
8       {
9         "file_name": "nationwidechildrens.org_clinical.TCGA-EY-A5W2.xml"
10      }
11    ],
12    "pagination": {
13      "count": 2,
14      "sort": "",
15      "from": 0,
16      "pages": 300936,
17      "total": 601872,
18      "page": 1,
19      "size": 2
20    }
21  }

```

```

19     }
20 },
21 "warnings": {}
22 }

```

```
1 curl 'https://api.gdc.cancer.gov/files?fields=file_name&from=101&size=5&pretty=true'
```

```

1 import requests
2 import json
3
4 files_endpt = 'https://api.gdc.cancer.gov/files'
5 params = {'fields': 'file_name',
6           'from': 101, 'size': 5}
7 response = requests.get(files_endpt, params = params)
8 print json.dumps(response.json(), indent=2)

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "file_name": "OCULI_p_TCGA_159_160_SNP_N_GenomeWideSNP_6_E09_831242.grch38.seg.txt",
6         "id": "1d959137-d8e6-4336-b357-8ab9c88eeca8"
7       },
8       {
9         "file_name":
10          "jhu-usc.edu_SKCM.HumanMethylation450.3.lvl-3.TCGA-EE-A3JI-06A-11D-A21B-05.gdc_hg38.txt",
11        "id": "9c02ec95-4aa3-4112-8823-c0fa87f71773"
12      },
13      {
14        "file_name":
15          "jhu-usc.edu_LAML.HumanMethylation450.2.lvl-3.TCGA-AB-3002-03A-01D-0742-05.gdc_hg38.txt",
16        "id": "731c3560-bcef-4ebf-bfbc-7320399a5bcb"
17      },
18      {
19        "file_name": "CUSKS_p_TCGAb47_SNP_1N_GenomeWideSNP_6_B03_628222.grch38.seg.txt",
20        "id": "a6f73a3e-faf8-49d9-9b68-77781bd302df"
21      },
22      {
23        "file_name": "5496e9f1-a383-4874-95bb-f4d1b33f4594.vcf",
24        "id": "5496e9f1-a383-4874-95bb-f4d1b33f4594"
25      }
26    ],
27    "pagination": {
28      "count": 5,
29      "sort": "",
30      "from": 101,
31      "page": 21,
32      "total": 274724,
33      "pages": 54945,
34      "size": 5
35    }
36  }

```

Sort

The `sort` query parameter sorts the results by a specific field, and with the sort direction specified using the `:asc` (ascending) or `:desc` (descending) prefix, e.g. `sort=field:desc`. A list of all valid *field* names is available in Appendix A; the list can also be

accessed programmatically at the `_mapping` endpoint.

Example

Sort cases by `submitter_id` in ascending order:

```
1 curl 'https://api.gdc.cancer.gov/cases?fields=submitter_id&sort=submitter_id:asc&pretty=true'
```

```
1 import requests
2 import json
3
4 cases_endpt = 'https://api.gdc.cancer.gov/cases'
5 params = {'fields': 'submitter_id',
6           'sort': 'submitter_id:asc'}
7 response = requests.get(cases_endpt, params = params)
8 print json.dumps(response.json(), indent=2)
```

```
1 {
2   "data": {
3     "hits": [
4       {
5         "id": "f7af65fc-97e3-52ce-aa2c-b707650e747b",
6         "submitter_id": "TARGET-00-NAAEMA"
7       },
8       {
9         "id": "513d0a2a-3c94-5a36-97a4-24c3656fc66e",
10        "submitter_id": "TARGET-00-NAAEMB"
11      },
12      {
13        "id": "b5f20676-727b-50b0-9b5a-582cd8572d6d",
14        "submitter_id": "TARGET-00-NAAEMC"
15      },
16      {
17        "id": "0c0b183f-0d4a-5a9d-9888-0617cebccc462",
18        "submitter_id": "TARGET-20-PABGKN"
19      },
20      {
21        "id": "0f5ed7a7-226d-57bc-a4ce-8a6b18560c55",
22        "submitter_id": "TARGET-20-PABHET"
23      },
24      {
25        "id": "b2a560a4-5e52-5d78-90ef-d680fbaf44d0",
26        "submitter_id": "TARGET-20-PABHKY"
27      },
28      {
29        "id": "1e5c8323-383d-51a0-9199-1b9504b29c7e",
30        "submitter_id": "TARGET-20-PABLDZ"
31      },
32      {
33        "id": "c550a267-30bd-5bf3-9699-61341559e0d5",
34        "submitter_id": "TARGET-20-PACDZR"
35      },
36      {
37        "id": "0fe29a81-74fc-5158-ae13-0437bc272805",
38        "submitter_id": "TARGET-20-PACEGD"
39      },
40      {
41        "id": "dd2b23ec-46f4-56b2-9429-6015c6dc730f",
```

```

42     "submitter_id": "TARGET-20-PADDXZ"
43   }
44 ],
45 "pagination": {
46   "count": 10,
47   "sort": "submitter_id:asc",
48   "from": 0,
49   "page": 1,
50   "total": 14551,
51   "pages": 1456,
52   "size": 10
53 }
54 },
55 "warnings": {}
56 }

```

Facets

The **facets** parameter provides aggregate information for a specified field. It provides all values that exist for that field, and the number of entities (cases, projects, files, or annotations) that this value. The primary intended use of this parameter is for displaying aggregate information in the GDC Data Portal.

The **facets** parameter can be used in conjunction with the **filters** parameter to get aggregate information for a set of search results. The following limitations apply when using **facets** and **filters** together:

1. The **filters** object's top level operator must be **and**, and the internal filters must be limited to: **=**, **!=**, **in**, **exclude**, **is**, and **not**.
2. The information provided by **facets** for a given field will disregard any filters applied to that same field.

Example

This is an example of a request for a count of projects in each program.

```

1 curl
   'https://api.gdc.cancer.gov/projects?facets=program.name&from=0&size=0&sort=program.name:asc&pretty=true'

```

```

1 import requests
2 import json
3
4 projects_endpt = 'https://api.gdc.cancer.gov/projects'
5 params = {'facets': 'program.name',
6           'from': 0, 'size': 0,
7           'sort': 'program.name:asc'}
8 response = requests.get(projects_endpt, params = params)
9 print json.dumps(response.json(), indent=2)

```

```

1 {
2   "data": {
3     "pagination": {
4       "count": 0,
5       "sort": "program.name:asc",
6       "from": 0,
7       "page": 1,
8       "total": 39,
9       "pages": 39,
10      "size": 0
11    },

```

```

12  "hits": [],
13  "aggregations": {
14    "program.name": {
15      "buckets": [
16        {
17          "key": "TCGA",
18          "doc_count": 33
19        },
20        {
21          "key": "TARGET",
22          "doc_count": 6
23        }
24      ]
25    }
26  }
27 },
28 "warnings": {}
29 }

```

Example

In this sample POST request, both **filters** and **facets** parameters are used. Note that **facets** ignores the **primary_site** filter.

```

1 {
2   "filters":{
3     "op":"and",
4     "content":[
5       {
6         "op": "=",
7         "content":{
8           "field":"cases.project.primary_site",
9           "value":"Kidney"
10        }
11      },
12      {
13        "op": "=",
14        "content":{
15          "field":"project.program.name",
16          "value":"TCGA"
17        }
18      }
19    ]
20  },
21  "size":"0",
22  "facets":"project.primary_site",
23  "pretty":"true"
24 }

```

```

1 curl --request POST --header "Content-Type: application/json" --data @Payload
   'https://api.gdc.cancer.gov/v0/cases'

```

```

1 {
2   "data": {
3     "pagination": {
4       "count": 0,
5       "sort": "",
6       "from": 0,

```

```

7   "page": 1,
8   "total": 941,
9   "pages": 941,
10  "size": 0
11 },
12 "hits": [],
13 "aggregations": {
14   "project.primary_site": {
15     "buckets": [
16       {
17         "key": "Brain",
18         "doc_count": 1133
19       },
20       {
21         "key": "Breast",
22         "doc_count": 1098
23       },
24       {
25         "key": "Lung",
26         "doc_count": 1089
27       },
28       {
29         "key": "Kidney",
30         "doc_count": 941
31       },
32       {
33         "key": "Colorectal",
34         "doc_count": 635
35       },
36       {
37         "key": "Uterus",
38         "doc_count": 617
39       },
40       {
41         "key": "Ovary",
42         "doc_count": 608
43       },
44       {
45         "key": "Head and Neck",
46         "doc_count": 528
47       },
48       {
49         "key": "Thyroid",
50         "doc_count": 507
51       },
52       {
53         "key": "Prostate",
54         "doc_count": 500
55       },
56       {
57         "key": "Stomach",
58         "doc_count": 478
59       },
60       {
61         "key": "Skin",
62         "doc_count": 470
63       },
64       {

```

```

65         "key": "Bladder",
66         "doc_count": 412
67     },
68     {
69         "key": "Liver",
70         "doc_count": 377
71     },
72     {
73         "key": "Cervix",
74         "doc_count": 308
75     },
76     {
77         "key": "Adrenal Gland",
78         "doc_count": 271
79     },
80     {
81         "key": "Soft Tissue",
82         "doc_count": 261
83     },
84     {
85         "key": "Bone Marrow",
86         "doc_count": 200
87     },
88     {
89         "key": "Esophagus",
90         "doc_count": 185
91     },
92     {
93         "key": "Pancreas",
94         "doc_count": 185
95     },
96     {
97         "key": "Testis",
98         "doc_count": 150
99     },
100    {
101        "key": "Thymus",
102        "doc_count": 124
103    },
104    {
105        "key": "Pleura",
106        "doc_count": 87
107    },
108    {
109        "key": "Eye",
110        "doc_count": 80
111    },
112    {
113        "key": "Lymph Nodes",
114        "doc_count": 58
115    },
116    {
117        "key": "Bile Duct",
118        "doc_count": 51
119    }
120 ]
121 }
122 }

```

```
123     },
124     "warnings": {}
125 }
```

Alternative Request Format

The GDC API also supports POST requests with `Content-Type: application/x-www-form-urlencoded` (curl default), which require payloads in the following format:

filters=%7B%0A%20%20%20%20%22op%22%3A%22in%22%2C%0A%20%20%20%20%22content%22%3A%7B%0A%20%20%20%20%20%20%20%2

Using Wildcards

The GDC API supports the use of the wildcard character, an asterisk (*), in the **value** fields of a JSON query. For example if a user wanted to retrieve information about projects with a disease type that ended in “Adenocarcinoma” a query for **"disease type": "*Adenocarcinoma"** would be appropriate. See below:

```

1 {
2   "size": "20000",
3   "pretty": "TRUE",
4   "fields": "submitter_id,disease_type",
5   "format": "TSV",
6   "filters": {
7     "op": "=",
8     "content": {
9       "field": "disease_type",
10      "value": "*Adenocarcinoma"
11    }
12  }
13 }

```

Quicksearch Endpoint

The GDC Portal has a quicksearch functionality that allows for a project, case, or file to be queried from a search box. This function calls the `/v0/all` endpoint, which retrieves the top cases, files, and projects that match to the query. The quicksearch can also be used programmatically through the API. For example, a search term of ‘TCGA’ would produce the following query:

```
1 curl "https://api.gdc.cancer.gov/v0/all?query=TCGA&size=5"
```

```

1 {
2   "data": {
3     "query": {
4       "hits": [
5         {
6           "disease_type": [
7             "Esophageal Carcinoma"
8           ],
9           "id": "UHJvamVjdDpUQ0dBLUVtQ0E=",
10          "name": "Esophageal Carcinoma",
11          "primary_site": [
12            "Esophagus"
13          ],
14          "project id": "TCGA-ESCA"

```

```

15     },
16     {
17         "disease_type": [
18             "Head and Neck Squamous Cell Carcinoma"
19         ],
20         "id": "UHJvamVjdDpUQ0dBLUhOUOM=",
21         "name": "Head and Neck Squamous Cell Carcinoma",
22         "primary_site": [
23             "Head and Neck"
24         ],
25         "project_id": "TCGA-HNSC"
26     },
27     {
28         "disease_type": [
29             "Liver Hepatocellular Carcinoma"
30         ],
31         "id": "UHJvamVjdDpUQ0dBLUxJSEM=",
32         "name": "Liver Hepatocellular Carcinoma",
33         "primary_site": [
34             "Liver"
35         ],
36         "project_id": "TCGA-LIHC"
37     },
38     {
39         "disease_type": [
40             "Colon Adenocarcinoma"
41         ],
42         "id": "UHJvamVjdDpUQ0dBLUNPQUQ=",
43         "name": "Colon Adenocarcinoma",
44         "primary_site": [
45             "Colorectal"
46         ],
47         "project_id": "TCGA-COAD"
48     },
49     {
50         "disease_type": [
51             "Adrenocortical Carcinoma"
52         ],
53         "id": "UHJvamVjdDpUQ0dBLUFdQw==",
54         "name": "Adrenocortical Carcinoma",
55         "primary_site": [
56             "Adrenal Gland"
57         ],
58         "project_id": "TCGA-ACC"
59     }
60 ]
61 }
62 }
63 }

```

This endpoint can be used to quickly retrieve information about a file. For example, if a user wanted to know the UUID for `nationwidechildrens.org_biospecimen.TCGA-EL-A4K1.xml`, the following query could be used to quickly retrieve it programmatically:

```
1 curl "https://api.gdc.cancer.gov/v0/all?query=nationwidechildrens.org_biospecimen.TCGA-EL-A4K1.xml&size=5"
```

```

1 {
2   "data": {
3     "query": {

```

```
4     "hits": [  
5         {  
6             "file_id": "2a7a354b-e497-4ae6-8a85-a170951596c1",  
7             "file_name": "nationwidechildrens.org_biospecimen.TCGA-EL-A4K1.xml",  
8             "id": "RmlsZToyYTdhMzU0Yi11NDk3LTRhZTYtOGE4NS1hMTcwOTUxNTk2YzE=",  
9             "submitter_id": null  
10        }  
11    ]  
12 }  
13 }  
14 }
```

Additional Examples

More examples of API functionality described in this section are provided in Additional Examples.

Chapter 3

Downloading Files

Downloading Files

The GDC API implements file download functionality using **data** and **manifest** endpoints. The **data** endpoint allows users to download files stored in the GDC by specifying file UUID(s). The **manifest** endpoint generates a download manifest file that can be used with the GDC Data Transfer Tool to transfer large volumes of data.

Note: Downloading controlled access data requires the use of an authentication token. See [Getting Started: Authentication](#) for details.

Note: Requests to download data from the GDC Legacy Archive must be directed to **legacy/data**. See [Getting Started: Legacy Archive](#) for details.

Data endpoint

To download a file, users can pass UUID(s) to the **data** endpoint. If a single UUID is provided, the API will return the associated file. If a comma-separated list of UUIDs is provided, the API will return an archive file containing the requested files.

The **data** endpoint supports GET and POST requests as demonstrated in the following examples.

Related Files

If the **related_files=true** parameter is specified, the following related files, if available, will be included in the download package by the GDC API:

- BAM index files (BAI files)
- Metadata files (such as SRA XML or MAGE-TAB files)

For example, this request will download a legacy copy number segmentation file and its associated MAGE-TAB metadata file:

```
1 https://api.gdc.cancer.gov/legacy/data/7efc039a-fde3-4bc1-9433-2fc6b5e3ffa5?related_files=true
```

Downloading a Single File using GET

This example demonstrates downloading a single file from the GDC. Here we pass the file's UUID to the **data** endpoint with a GET request.

```
1 curl --remote-name --remote-header-name  
  'https://api.gdc.cancer.gov/data/5b2974ad-f932-499b-90a3-93577a9f0573'
```

```

1  % Total      % Received % Xferd  Average Speed   Time    Time       Time  Current
2                                Dload  Upload   Total   Spent    Left   Speed
3 100 6111k  100 6111k    0      0   414k      0  0:00:14  0:00:14  --:--:--  412k
4 curl: Saved to filename '14-3-3_beta-R-V_GBL1112940.tif'

```

Downloading Multiple Files using GET

This example demonstrates downloading multiple files from the GDC using a GET request. The GDC API returns a `.tar.gz` archive containing the downloaded files.

```

1 curl --remote-name --remote-header-name
   'https://api.gdc.cancer.gov/data/e3228020-1c54-4521-9182-1ea14c5dc0f7,18e1e38e-0f0a-4a0e-918f-08e6201ea140'

```

```

1 % Total      % Received % Xferd  Average Speed   Time    Time       Time  Current
2                                Dload  Upload   Total   Spent    Left   Speed
3 100  287k    0  287k    0      0 30131      0  --:--:--  0:00:09  --:--:--  42759
4 curl: Saved to filename 'gdc_download_064d1aa8cc8cbab33e93979bebbf7d6af2d6a802.tar.gz'

```

Note: This method supports downloading a limited number of files at one time. To download a large number of files, please use [POST](#).

Downloading an Uncompressed Group of Files

If the `?tarfile` parameter is specified to a data endpoint download query all files requested in the download string will be bundled in a single tar file rather than a tar.gz file which is the default behavior.

```

1 curl --remote-name --remote-header-name
   'https://api.gdc.cancer.gov/data/1da7105a-f0ff-479d-9f82-6c1d94456c91,77e73cc4-ff31-449e-8e3c-7ae5ce57838c?t

```

Downloading Multiple Files using POST

The following two examples demonstrate downloading multiple files from the GDC using a POST request that contains a payload in one of two formats: percent-encoded form data or JSON. The GDC API returns a `.tar.gz` archive containing the downloaded files.

As noted above, both the `data` and `legacy/data` endpoints accept POST requests.

POST request with form data payload

POST requests that carry a payload of percent-encoded form data must include the HTTP header `Content-Type: application/x-www-form-urlencoded`.

The payload is a string in the following format:

```

1 ids=UUID1&ids=UUID2&ids=UUID3...

```

where UUID corresponds to the UUIDs of the files to be downloaded.

In this example we use `curl` to download a set of files from the GDC Legacy Archive. The payload is stored in a plain text file named `Payload`; `curl` includes the `Content-Type: application/x-www-form-urlencoded` header by default.

```

1 ids=556e5e3f-0ab9-4b6c-aa62-c42f6a6cf20c&ids=e0de63e2-02f3-4309-9b24-69f4c24e85fc&ids=f1a06178-2ec2-4b06-83f3-3a

```

```

1 curl --remote-name --remote-header-name --request POST 'https://api.gdc.cancer.gov/legacy/data' --data
   @Payload

```

```

1  % Total      % Received % Xferd  Average Speed   Time    Time       Time  Current
2                                Dload  Upload   Total   Spent    Left   Speed
3 100 2562k    0 2561k  100   983   880k    337  0:00:02  0:00:02  --:--:--  880k
4 curl: Saved to filename 'gdc_download_20160701_011153.tar.gz'

```

POST request with JSON payload

POST requests that carry a JSON payload must include the HTTP header `Content-Type: application/json`.

The payload is a string in the following format:

```
1 {  
2   "ids": [  
3     "UUID1",  
4     "UUID2",  
5     ...  
6     "UUID3"  
7   ]  
8 }
```

where UUID corresponds to the UUIDs of the files to be downloaded.

In this example we use `curl` to download a set of files from the GDC Legacy Archive; the payload is stored in a plain text file named `Payload`.

```
1 {  
2   "ids": [  
3     "556e5e3f-0ab9-4b6c-aa62-c42f6a6cf20c",  
4     "e0de63e2-02f3-4309-9b24-69f4c24e85fc",  
5     "f1a06178-2ec2-4b06-83f3-3aedac332cfe",  
6     "11a8aca0-c8e6-4ff8-8ab6-fe18a1b8ba82",  
7     "69a69c84-00de-45ff-b397-fd2b6713ed4f",  
8     "9ec48233-395d-401e-b205-951c971f8dd4",  
9     "93129547-378c-4b69-b858-532abfff678e",  
10    "8d4277e9-a472-4590-886d-24dc2538ea65",  
11    "6733b412-56da-4f1c-a12b-ff804cb656d7",  
12    "a72eec98-c5e0-4866-8953-765780acb6c1",  
13    "e77b2294-1bdd-4fba-928a-d81d2622312f",  
14    "965e01fc-318e-4c02-a801-d6fad60bfae4",  
15    "21ad5409-fe0b-4728-97e4-15520b9fc287",  
16    "1a777521-277c-4aeb-baf1-66871a7c2d2a",  
17    "c13a3449-9e0d-45a9-bcc0-518f55e45c8a",  
18    "5f2d329b-d59d-4112-b490-5114b830e34d",  
19    "bb966617-6c1f-4bb0-a1ed-ceb37ecade67",  
20    "05d11519-2b33-4742-aa87-3934632f2f2b",  
21    "39bfafe2-9628-434e-bd72-148051a47477",  
22    "481bea69-3cd5-45f3-8a52-2d4cc8fc8df7",  
23    "f95e407b-de69-416c-920c-6be8c9414862",  
24    "75940293-8fa6-47f9-ad5d-155b61933fdc",  
25    "e8e84ccf-f8a8-4551-9257-ef731d02116f",  
26    "e4991159-f088-4a2a-88b7-38d6ac47c6bc"  
27   ]  
28 }
```

```
1 curl --remote-name --remote-header-name --request POST --header 'Content-Type: application/json' --data  
   @request.txt 'https://api.gdc.cancer.gov/legacy/data'
```

```
1  % Total    % Received % Xferd  Average Speed   Time    Time       Time  Current  
2                                Dload  Upload   Total   Spent    Left   Speed  
3 100 2562k    0 2561k  100  1145    788k    352   0:00:03   0:00:03  --:--:--   788k  
4 curl: Saved to filename 'gdc_download_20160701_011007.tar.gz'
```

Downloading Controlled-access Files

To download controlled-access files, a valid authentication token must be passed to the GDC API using the **X-Auth-Token** HTTP header:

```
1 token=$(gdc-token-text-file.txt)
2
3 curl --remote-name --remote-header-name --header "X-Auth-Token: $token"
   'https://api.gdc.cancer.gov/data/0eccf79d-1f1e-4205-910f-8e126b08276e'

1  % Total      % Received % Xferd  Average Speed   Time    Time       Time  Current
2                                Dload  Upload    Total     Spent      Left     Speed
3 100 31.4M  100 31.4M    0     0   290k      0  0:01:50  0:01:50 --:--:--   172k
4 curl: Saved to filename
   'ACOLD_p_TCGA_Batch17_SNP_N_GenomeWideSNP_6_A03_466078.tangent.copynumber.data.txt'
```

Manifest endpoint

The `manifest` endpoint generates a download manifest file that can be used with the GDC Data Transfer Tool. The Data Transfer Tool is recommended for transferring large volumes of data. The GDC API can also generate a download manifest from a list of results that match a Search and Retrieval query. To do this, append `&return_type=manifest` to the end of the query.

Using the manifest endpoint

The **manifest** endpoint allows users to create a download manifest, which can be used with the GDC Data Transfer Tool to download a large volume of data. The **manifest** endpoint generates a manifest file from a comma-separated list of UUIs.

```
1 curl --remote-name --remote-header-name
   'https://api.gdc.cancer.gov/v0/manifest/ae9db773-78ab-48d0-972d-debe1bedd37d,3d815e6e-db97-419d-ad7f-dba4e40
1  % Total    % Received % Xferd  Average Speed   Time    Time       Time  Current
2                Dload  Upload    Total     Spent      Left     Speed
3 100   274   100   274    0    0   1042      0  --:--:--  --:--:--  --:--:--   1041
4 curl: Saved to filename 'gdc_manifest_20160428_234614.txt'
```

The **manifest** endpoint also supports HTTP POST requests in the same format as the **data** endpoint; see [above](#) for details.

Using return_type=manifest

Alternatively, users can create a manifest by appending `&return_type=manifest` to a Search and Retrieval query. In this example, we generate a download manifest for RNA-seq data files from solid tissue normal samples, that are part of the TCGA-KIRC project:

```
1 curl --remote-name --remote-header-name  
    'https://api.gdc.cancer.gov/files?filters=%7B%22op%22%3A%22and%22%2C%22content%22%3A%5B%7B%22op%22%3A%22%3D%  
  
1 % Total      % Received % Xferd   Average Speed   Time    Time       Time  Current  
2              Dload  Upload    Total     Spent      Left   Speed  
3 100 40663    0 40663    0      0  77109      0 --:--:-- --:--:-- --:--:--  77306  
4 curl: Saved to filename 'gdc_manifest.2016-06-28T13:26:33.850459.tsv'
```

Chapter 4

Data Analysis

Data Analysis

The GDC DAVE tools use the same API as the rest of the Data Portal and takes advantage of several new endpoints. Similar to the [GDC Data Portal Exploration](#) feature, the GDC data analysis endpoints allow API users to programmatically explore data in the GDC using advanced filters at a gene and mutation level. Survival analysis data is also available.

Endpoints

The following data analysis endpoints are available from the GDC API:

Endpoint	Description
<code>/genes</code>	Allows users to access summary information about each gene using its Ensembl ID.
<code>/ssms</code>	Allows users to access information about each somatic mutation. For example, a ssm would represent the transition of C to T at position 52000 of chromosome 1.
<code>/ssm_occurrences</code>	A ssm entity as applied to a single instance (case). An example of a ssm occurrence would be that the transition of C to T at position 52000 of chromosome 1 occurred in patient TCGA-XX-XXXX.
<code>/analysis/top_cases_counts_by_genes</code>	Returns the number of cases with a mutation in each gene listed in the <code>gene_ids</code> parameter for each project. Note that this endpoint cannot be used with the format or fields parameters.
<code>/analysis/top_mutated_genes_by_project</code>	Returns a list of genes that have the most mutations within a given project.
<code>/analysis/top_mutated_cases_by_gene</code>	Generates information about the cases that are most affected by mutations in a given number of genes
<code>/analysis/mutated_cases_count_by_project</code>	Returns counts for the number of cases that have associated ssm data in each project. The number of affected cases can be found under “ <code>case_with_ssm</code> ”: {“ <code>doc_count</code> ”: \$ <code>case_count</code> }.
<code>/analysis/survival</code>	Survival plots can be generated in the Data Portal for different subsets of data, based upon many query factors such as variants, disease type and projects. This endpoint can be used to programmatically retrieve the raw data to generate these plots and apply different filters to the data. (see Survival Example)

The methods for retrieving information from these endpoints are very similar to those used for the `cases` and `files` endpoints. These methods are explored in depth in the [API Search and Retrieval](#) documentation. The `_mapping` parameter can also be used with each of these endpoints to generate a list of potential fields. For example:

```
https://api.gdc.cancer.gov/ssms/_mapping
```

Note: While it is not an endpoint, the `observation` entity is featured in the visualization section of the API. The `observation` entity provides information from the MAF file, such as read depth and normal genotype, that supports the validity of the associated `ssm`. An example is demonstrated below:

```
1 curl
   "https://api.gdc.cancer.gov/ssms/57bb3f2e-ec05-52c2-ab02-7065b7d24849?expand=occurrence.case.observation.read"

1 {
2   "data": {
3     "ncbi_build": "GRCh38",
4     "occurrence": [
5       {
6         "case": {
7           "observation": [
8             {
9               "read_depth": {
10                 "t_ref_count": 321,
11                 "t_alt_count": 14,
12                 "t_depth": 335,
13                 "n_depth": 115
14               }
15             }
16           ]
17         }
18       }
19     ],
20     "tumor_allele": "G",
21     "mutation_type": "Simple Somatic Mutation",
22     "end_position": 14304578,
23     "reference_allele": "C",
24     "ssm_id": "57bb3f2e-ec05-52c2-ab02-7065b7d24849",
25     "start_position": 14304578,
26     "mutation_subtype": "Single base substitution",
27     "cosmic_id": null,
28     "genomic_dna_change": "chr5:g.14304578C>G",
29     "gene_aa_change": [
30       "TRIO L229V",
31       "TRIO L437V",
32       "TRIO L447V",
33       "TRIO L496V"
34     ],
35     "chromosome": "chr5"
36   },
37   "warnings": {}
38 }
```

Genes Endpoint Examples

Example 1: A user would like to access information about the gene `ZMPSTE24`, which has an Ensembl gene ID of `ENSG00000084073`. This would be accomplished by appending `ENSG00000084073` (`gene_id`) to the `genes` endpoint.

```
1 curl "https://api.gdc.cancer.gov/genes/ENSG00000084073?pretty=true"
```

```
1 {
2   "data": {
3     "canonical_transcript_length": 3108,
4     "description": "This gene encodes a member of the peptidase M48A family. The encoded protein is a
      zinc metalloproteinase involved in the two step post-translational proteolytic cleavage of
      carboxy terminal residues of farnesylated prelamin A to form mature lamin A. Mutations in this
      gene have been associated with mandibuloacral dysplasia and restrictive dermopathy. [provided by
      RefSeq, Jul 2008]",
5     "cytoband": [
6       "1p34.2"
7     ],
8     "gene_start": 40258107,
9     "canonical_transcript_length_genomic": 36078,
10    "gene_id": "ENSG00000084073",
11    "gene_strand": 1,
12    "canonical_transcript_length_cds": 1425,
13    "gene_chromosome": "1",
14    "synonyms": [
15      "FACE-1",
16      "HGPS",
17      "PRO1",
18      "STE24",
19      "Ste24p"
20    ],
21    "is_cancer_gene_census": null,
22    "biotype": "protein_coding",
23    "gene_end": 40294184,
24    "canonical_transcript_id": "ENST00000372759",
25    "symbol": "ZMPSTE24",
26    "name": "zinc metalloproteinase STE24"
27  },
28  "warnings": {}
29 }
```

Example 2: A user wants a subset of elements such as a list of coordinates for all genes on chromosome 7. The query can be filtered for only results from chromosome 7 using a JSON-formatted query that is URL-encoded.

```
1 curl
   "https://api.gdc.cancer.gov/genes?pretty=true&fields=gene_id,symbol,gene_start,gene_end&format=tsv&size=2000"

1 gene_start      gene_end      symbol  id
2 28995231        29195451     CPVL    ENSG00000106066
3 33014114        33062797     NT5C3A  ENSG00000122643
4 143052320       143053347    OR6V1   ENSG00000225781
5 100400826       100428992    ZCWPW1  ENSG00000078487
6 73861159        73865893     WBSR28  ENSG00000175877
7 64862999        64864370     EEF1DP4 ENSG00000213640
8 159231435       159233377    PIP5K1P2 ENSG00000229435
9 141972631       141973773    TAS2R38 ENSG00000257138
10 16646131        16706523     BZW2    ENSG00000136261
11 149239651       149255609    ZNF212  ENSG00000170260
12 57405025        57405090     MIR3147 ENSG00000266168
13 130393771       130442433    CEP41   ENSG00000106477
14 150800403       150805120    TMEM176A ENSG00000002933
15 93591573        93911265     GNGT1   ENSG00000127928
16 117465784       117715971    CFTR    ENSG00000001626
17 5879827 5886362 OCM      ENSG00000122543
18 144118461       144119360    OR2A15P ENSG00000239981
19 30424527        30478784     NOD1    ENSG00000106100
```

```

20 137227341      137343865      PTN      ENSG00000105894
21 84876554      84876956      HMG2P11      ENSG00000232605
22 107470018     107475659     GPR22      ENSG00000172209
23 31330711      31330896      RP11-463M14.1  ENSG00000271027
24 78017057      79453574      MAGI2      ENSG00000187391
25 55736779      55739605      CICP11     ENSG00000237799
26 142111749     14222324     RP11-1220K2.2  ENSG00000257743
27 (truncated)

```

Simple Somatic Mutation Endpoint Examples

Example 1: Similar to the `/genes` endpoint, a user would like to retrieve information about the mutation based on its COSMIC ID. This would be accomplished by creating a JSON filter such as:

```

1 {
2   "op": "in",
3   "content": {
4     "field": "cosmic_id",
5     "value": [
6       "COSM4860838"
7     ]
8   }
9 }

```

```

1 curl
   'https://api.gdc.cancer.gov/ssms?pretty=true&filters=%7B%0A%22op%22%3A%22in%22%2C%0A%22content%22%3A%7B%0A%22

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "ncbi_build": "GRCh38",
6         "mutation_type": "Simple Somatic Mutation",
7         "mutation_subtype": "Single base substitution",
8         "end_position": 62438203,
9         "reference_allele": "C",
10        "ssm_id": "8b3c1a7a-e4e0-5200-9d46-5767c2982145",
11        "start_position": 62438203,
12        "cosmic_id": [
13          "COSM4860838",
14          "COSM731764",
15          "COSM731765"
16        ],
17        "id": "8b3c1a7a-e4e0-5200-9d46-5767c2982145",
18        "tumor_allele": "T",
19        "gene_aa_change": [
20          "CADPS G1147G",
21          "CADPS G1187G",
22          "CADPS G1217G",
23          "CADPS G1226G",
24          "CADPS G127G",
25          "CADPS G218G",
26          "CADPS G95G"
27        ],
28        "chromosome": "chr3",
29        "genomic_dna_change": "chr3:g.62438203C>T"

```



```

30     }
31 ],
32     "pagination": {
33         "count": 1,
34         "sort": "",
35         "from": 0,
36         "page": 1,
37         "total": 1,
38         "pages": 1,
39         "size": 10
40     }
41 },
42     "warnings": {}
43 }

```

Simple Somatic Mutation Occurrence Endpoint Examples

Example 1: A user wants to determine the chromosome in case TCGA-DU-6407 that contains the greatest number of `ssms`. As this relates to mutations that are observed in a case, the `ssm_occurrences` endpoint is used.

```
1 {
2   "op": "in",
3   "content": {
4     "field": "case.submitter_id",
5     "value": ["TCGA-DU-6407"]
6   }
7 }
```

```
1 curl
  "https://api.gdc.cancer.gov/ssm_occurrences?format=tsv&fields=ssm.chromosome&size=5000&filters=%7B%0D%0A%22c
```

1	ssm.chromosome	id
2	chr3	552c09d1-69b1-5c04-b543-524a6feae3eb
3	chr10	391011ff-c1fd-5e2a-a128-652bc660f64c
4	chr10	1378cbc4-af88-55bb-b2e5-185bb4246d7a
5	chr10	3a2b3870-a395-5bc3-8c8f-0d40b0f2202c
6	chr1	4a93d7a5-988d-5055-80da-999dc3b45d80
7	chrX	22a07c7c-16ba-51df-a9a9-1e41e2a45225
8	chr12	dbc5eafa-ea26-5f1c-946c-b6974a345b69
9	chr11	02ae553d-1f27-565d-96c5-2c3cfa7264a
10	chr2	faee73a9-4804-58ea-a91f-18c3d901774f
11	chr6	97c5b38b-fc96-57f5-8517-cc702b3aa70a
12	chr17	0010a89d-9434-5d97-8672-36ee394767d0
13	chr19	f08dcc53-eadc-5ceb-bf31-f6b38629e4cb
14	chrX	19ca262d-b354-54a0-b582-c4719e37e91d
15	chr19	c44a93a1-5c73-5cff-b40e-98ce7e5fe57b
16	chr3	b67f31b5-0341-518e-8fcc-811cd2e36af1
17	chr1	94abd5fd-d539-5a4a-8719-9615cf7cec5d
18	chr17	1476a543-2951-5ec4-b165-67551b47d810
19	chr2	b4822fc9-f0cc-56fd-9d97-f916234e309d
20	chr2	3548ecfe-5186-51e7-8f40-37f4654cd260
21	chr16	105e7811-4601-5ccb-ae93-e7107923599e
22	chr2	99b3aad4-d368-506d-99d6-047cbe5dff0f
23	chr13	9dc3f7cd-9efa-530a-8524-30d067e49d54
24	chr21	1267f330b-ae6d-5e25-b19e-34e98523679e
25	chr16	c77f7ce5-fbe6-5da4-9a7b-b528f8e530cb

```

26 chr10 2cb06277-993e-5502-b2c5-263037c45d18
27 chr17 d25129ad-3ad7-584f-bdeb-fba5c3881d32
28 chr17 a76469cb-973c-5d4d-bf82-7cf4e8f6c129
29 chr10 727c9d57-7b74-556f-aa5b-e1ca1f76d119
30 chr15 b4a86ffd-e60c-5c9c-aaa1-9e9f02d86116
31 chr5 3a023e72-da92-54f7-aa18-502c1076b2b0

```

Analysis Endpoints

In addition to the `ssms`, `ssm_occurrences`, and `genes` endpoints mentioned previously, several `/analysis` endpoints were designed to quickly retrieve specific datasets used for visualization display.

Example 1: The `/analysis/top_cases_counts_by_genes` endpoint gives the number of cases with a mutation in each gene listed in the `gene_ids` parameter for each project. Note that this endpoint cannot be used with the `format` or `fields` parameters. In this instance, the query will produce the number of cases in each projects with mutations in the gene `ENSG00000155657`.

```
1 curl "https://api.gdc.cancer.gov/analysis/top_cases_counts_by_genes?gene_ids=ENSG00000155657&pretty=true"
```

This JSON-formatted output is broken up by project. For an example, see the following text:

```

1      "genes": {
2        "my_genes": {
3          "gene_id": {
4            "buckets": [
5              {
6                "key": "ENSG00000155657",
7                "doc_count": 45
8              }
9            ],
10           "sum_other_doc_count": 0,
11           "doc_count_error_upper_bound": 0
12         },
13         "doc_count": 45
14       },
15       "doc_count": 12305
16     },
17     "key": "TCGA-GBM",
18     "doc_count": 45
19   }

```

This portion of the output shows TCGA-GBM including 45 cases that have `ssms` in the gene `ENSG00000155657`.

Example 2: The following demonstrates a use of the `/analysis/top_mutated_genes_by_project` endpoint. This will output the genes that are mutated in the most cases in “TCGA-DLBC” and will count the mutations that have a `HIGH` or `MODERATE` impact on gene function. Note that the `score` field does not represent the number of mutations in a given gene, but a calculation that is used to determine which genes have the greatest number of unique mutations.

```

1 {
2   "op": "AND",
3   "content": [
4     {
5       "op": "in",
6       "content": {
7         "field": "case.project.project_id",
8         "value": [
9           "TCGA-DLBC"
10        ]
11      }

```

```

12     },
13     {
14         "op": "in",
15         "content": {
16             "field": "case.ssm.consequence.transcript.annotation.impact",
17             "value": [
18                 "HIGH",
19                 "MODERATE"
20             ]
21         }
22     }
23 ]
24 }

```

```

1 curl
  "https://api.gdc.cancer.gov/analysis/top_mutated_genes_by_project?fields=gene_id,symbol&filters=%7B%22op%22%

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "_score": 14.0,
6         "symbol": "IGHV2-70",
7         "gene_id": "ENSG00000274576"
8       },
9       {
10        "_score": 14.0,
11        "symbol": "IGLV3-1",
12        "gene_id": "ENSG00000211673"
13      },
14      {
15        "_score": 14.0,
16        "symbol": "IGHM",
17        "gene_id": "ENSG00000211899"
18      },
19      {
20        "_score": 11.0,
21        "symbol": "KMT2D",
22        "gene_id": "ENSG00000167548"
23      },
24      {
25        "_score": 11.0,
26        "symbol": "IGLL5",
27        "gene_id": "ENSG00000254709"
28      },
29      {
30        "_score": 11.0,
31        "symbol": "BTG2",
32        "gene_id": "ENSG00000159388"
33      },
34      {
35        "_score": 9.0,
36        "symbol": "CARD11",
37        "gene_id": "ENSG00000198286"
38      },
39      {
40        "_score": 9.0,
41        "symbol": "IGHG1",

```

```

42     "gene_id": "ENSG00000211896"
43   },
44   {
45     "_score": 9.0,
46     "symbol": "IGLC2",
47     "gene_id": "ENSG00000211677"
48   },
49   {
50     "_score": 9.0,
51     "symbol": "LRP1B",
52     "gene_id": "ENSG00000168702"
53   }
54 ],
55 "pagination": {
56   "count": 10,
57   "sort": "None",
58   "from": 0,
59   "page": 1,
60   "total": 3214,
61   "pages": 322,
62   "size": 10
63 }
64 },
65 "warnings": {}
66 }

```

Example 3: The `/analysis/top_mutated_cases_by_gene` endpoint will generate information about the cases that are most affected by mutations in a given number of genes. Below, the file count for each category is given for the cases most affected by mutations in these 50 genes. The size of the output is limited to two cases with the `size=2` parameter, but a higher value can be set by the user.

```

1 curl
   "https://api.gdc.cancer.gov/analysis/top_mutated_cases_by_gene?fields=diagnoses.days_to_death,diagnoses.age_

1 {
2   "data": {
3     "hits": [
4       {
5         "_score": 7.0,
6         "diagnoses": [
7           {
8             "days_to_death": null,
9             "vital_status": "alive",
10            "age_at_diagnosis": 18691,
11            "primary_diagnosis": "c83.3"
12          }
13        ],
14        "case_id": "eda9496e-be80-4a13-bf06-89f0cc9e937f",
15        "demographic": {
16          "gender": "male",
17          "race": "white",
18          "ethnicity": "hispanic or latino"
19        },
20        "summary": {
21          "data_categories": [
22            {
23              "file_count": 1,
24              "data_category": "DNA Methylation"
25            }

```

```

26     {
27         "file_count": 5,
28         "data_category": "Transcriptome Profiling"
29     },
30     {
31         "file_count": 1,
32         "data_category": "Biospecimen"
33     },
34     {
35         "file_count": 16,
36         "data_category": "Simple Nucleotide Variation"
37     },
38     {
39         "file_count": 1,
40         "data_category": "Clinical"
41     },
42     {
43         "file_count": 4,
44         "data_category": "Copy Number Variation"
45     },
46     {
47         "file_count": 4,
48         "data_category": "Raw Sequencing Data"
49     }
50 ]
51 }
52 },
53 {
54     "_score": 4.0,
55     "diagnoses": [
56         {
57             "days_to_death": null,
58             "vital_status": "alive",
59             "age_at_diagnosis": 27468,
60             "primary_diagnosis": "c83.3"
61         }
62     ],
63     "case_id": "a43e5f0e-a21f-48d8-97e0-084d413680b7",
64     "demographic": {
65         "gender": "male",
66         "race": "white",
67         "ethnicity": "not hispanic or latino"
68     },
69     "summary": {
70         "data_categories": [
71             {
72                 "file_count": 1,
73                 "data_category": "DNA Methylation"
74             },
75             {
76                 "file_count": 5,
77                 "data_category": "Transcriptome Profiling"
78             },
79             {
80                 "file_count": 1,
81                 "data_category": "Biospecimen"
82             },
83             {

```

```

84         "file_count": 16,
85         "data_category": "Simple Nucleotide Variation"
86     },
87     {
88         "file_count": 1,
89         "data_category": "Clinical"
90     },
91     {
92         "file_count": 4,
93         "data_category": "Copy Number Variation"
94     },
95     {
96         "file_count": 4,
97         "data_category": "Raw Sequencing Data"
98     }
99 ]
100 }
101 }
102 ],
103 "pagination": {
104     "count": 2,
105     "sort": "None",
106     "from": 0,
107     "page": 1,
108     "total": 27,
109     "pages": 14,
110     "size": 2
111 }
112 },
113 "warnings": {}
114 }

```

Example 4: The `/analysis/mutated_cases_count_by_project` endpoint produces counts for the number of cases that have associated `ssm` data in each project. The number of affected cases can be found under `"case_with_ssm": {"doc_count": $case_count}`.

```
1 curl "https://api.gdc.cancer.gov/analysis/mutated_cases_count_by_project?size=0&pretty=true"
```

```

1 {
2   "hits": {
3     "hits": [],
4     "total": 14551,
5     "max_score": 0.0
6   },
7   "_shards": {
8     "successful": 9,
9     "failed": 0,
10    "total": 9
11  },
12  "took": 4,
13  "aggregations": {
14    "projects": {
15      "buckets": [
16        {
17          "case_summary": {
18            "case_with_ssm": {
19              "doc_count": 216
20            },
21            "doc_count": 637

```

```

22     },
23     "key": "TARGET-NBL",
24     "doc_count": 1127
25 },
26 {
27     "case_summary": {
28         "case_with_ssm": {
29             "doc_count": 1044
30         },
31         "doc_count": 7625
32     },
33     "key": "TCGA-BRCA",
34     "doc_count": 1098
35 },
36 {
37     "case_summary": {
38         "case_with_ssm": {
39             "doc_count": 8
40         },
41         "doc_count": 579
42     },
43     "key": "TARGET-AML",
44     "doc_count": 988
45 },
46 {
47     "case_summary": {
48         "case_with_ssm": {
49             "doc_count": 34
50         },
51         "doc_count": 290
52     },
53     "key": "TARGET-WT",
54     "doc_count": 652
55 },
56 {
57     "case_summary": {
58         "case_with_ssm": {
59             "doc_count": 396
60         },
61         "doc_count": 3197
62     },
63     "key": "TCGA-GBM",
64     "doc_count": 617
65 },
66 {
67     "case_summary": {
68         "case_with_ssm": {
69             "doc_count": 443
70         },
71         "doc_count": 3880
72     },
73     "key": "TCGA-OV",
74     "doc_count": 608
75 },
76 {
77     "case_summary": {
78         "case_with_ssm": {
79             "doc_count": 569

```

```

80     },
81     "doc_count": 3874
82 },
83 "key": "TCGA-LUAD",
84 "doc_count": 585
85 },
86 {
87     "case_summary": {
88         "case_with_ssm": {
89             "doc_count": 542
90         },
91         "doc_count": 3874
92     },
93     "key": "TCGA-UCEC",
94     "doc_count": 560
95 },
96 {
97     "case_summary": {
98         "case_with_ssm": {
99             "doc_count": 339
100         },
101         "doc_count": 3547
102     },
103     "key": "TCGA-KIRC",
104     "doc_count": 537
105 },
106 {
107     "case_summary": {
108         "case_with_ssm": {
109             "doc_count": 510
110         },
111         "doc_count": 3671
112     },
113     "key": "TCGA-HNSC",
114     "doc_count": 528
115 },
116 {
117     "case_summary": {
118         "case_with_ssm": {
119             "doc_count": 513
120         },
121         "doc_count": 3606
122     },
123     "key": "TCGA-LGG",
124     "doc_count": 516
125 },
126 {
127     "case_summary": {
128         "case_with_ssm": {
129             "doc_count": 496
130         },
131         "doc_count": 3536
132     },
133     "key": "TCGA-THCA",
134     "doc_count": 507
135 },
136 {
137     "case_summary": {

```



```

138     "case_with_ssm": {
139         "doc_count": 497
140     },
141     "doc_count": 3520
142 },
143 "key": "TCGA-LUSC",
144 "doc_count": 504
145 },
146 {
147     "case_summary": {
148         "case_with_ssm": {
149             "doc_count": 498
150         },
151         "doc_count": 3490
152     },
153     "key": "TCGA-PRAD",
154     "doc_count": 500
155 },
156 {
157     "case_summary": {
158         "case_with_ssm": {
159             "doc_count": 470
160         },
161         "doc_count": 3289
162     },
163     "key": "TCGA-SKCM",
164     "doc_count": 470
165 },
166 {
167     "case_summary": {
168         "case_with_ssm": {
169             "doc_count": 433
170         },
171         "doc_count": 3188
172     },
173     "key": "TCGA-COAD",
174     "doc_count": 461
175 },
176 {
177     "case_summary": {
178         "case_with_ssm": {
179             "doc_count": 441
180         },
181         "doc_count": 3095
182     },
183     "key": "TCGA-STAD",
184     "doc_count": 443
185 },
186 {
187     "case_summary": {
188         "case_with_ssm": {
189             "doc_count": 412
190         },
191         "doc_count": 2884
192     },
193     "key": "TCGA-BLCA",
194     "doc_count": 412
195 },

```

```

196 {
197   "case_summary": {
198     "case_with_ssm": {
199       "doc_count": 0
200     },
201     "doc_count": 0
202   },
203   "key": "TARGET-OS",
204   "doc_count": 381
205 },
206 {
207   "case_summary": {
208     "case_with_ssm": {
209       "doc_count": 375
210     },
211     "doc_count": 2635
212   },
213   "key": "TCGA-LIHC",
214   "doc_count": 377
215 },
216 {
217   "case_summary": {
218     "case_with_ssm": {
219       "doc_count": 305
220     },
221     "doc_count": 2142
222   },
223   "key": "TCGA-CESC",
224   "doc_count": 307
225 },
226 {
227   "case_summary": {
228     "case_with_ssm": {
229       "doc_count": 288
230     },
231     "doc_count": 2033
232   },
233   "key": "TCGA-KIRP",
234   "doc_count": 291
235 },
236 {
237   "case_summary": {
238     "case_with_ssm": {
239       "doc_count": 255
240     },
241     "doc_count": 1821
242   },
243   "key": "TCGA-SARC",
244   "doc_count": 261
245 },
246 {
247   "case_summary": {
248     "case_with_ssm": {
249       "doc_count": 149
250     },
251     "doc_count": 1192
252   },
253   "key": "TCGA-LAML",

```

```

254     "doc_count": 200
255 },
256 {
257     "case_summary": {
258         "case_with_ssm": {
259             "doc_count": 184
260         },
261         "doc_count": 1293
262     },
263     "key": "TCGA-ESCA",
264     "doc_count": 185
265 },
266 {
267     "case_summary": {
268         "case_with_ssm": {
269             "doc_count": 183
270         },
271         "doc_count": 1285
272     },
273     "key": "TCGA-PAAD",
274     "doc_count": 185
275 },
276 {
277     "case_summary": {
278         "case_with_ssm": {
279             "doc_count": 179
280         },
281         "doc_count": 1253
282     },
283     "key": "TCGA-PCPG",
284     "doc_count": 179
285 },
286 {
287     "case_summary": {
288         "case_with_ssm": {
289             "doc_count": 158
290         },
291         "doc_count": 1169
292     },
293     "key": "TCGA-READ",
294     "doc_count": 172
295 },
296 {
297     "case_summary": {
298         "case_with_ssm": {
299             "doc_count": 150
300         },
301         "doc_count": 1018
302     },
303     "key": "TCGA-TGCT",
304     "doc_count": 150
305 },
306 {
307     "case_summary": {
308         "case_with_ssm": {
309             "doc_count": 123
310         },
311         "doc_count": 867

```

```

312     },
313     "key": "TCGA-THYM",
314     "doc_count": 124
315 },
316 {
317     "case_summary": {
318         "case_with_ssm": {
319             "doc_count": 66
320         },
321         "doc_count": 556
322     },
323     "key": "TCGA-KICH",
324     "doc_count": 113
325 },
326 {
327     "case_summary": {
328         "case_with_ssm": {
329             "doc_count": 92
330         },
331         "doc_count": 620
332     },
333     "key": "TCGA-ACC",
334     "doc_count": 92
335 },
336 {
337     "case_summary": {
338         "case_with_ssm": {
339             "doc_count": 83
340         },
341         "doc_count": 605
342     },
343     "key": "TCGA-MESO",
344     "doc_count": 87
345 },
346 {
347     "case_summary": {
348         "case_with_ssm": {
349             "doc_count": 80
350         },
351         "doc_count": 560
352     },
353     "key": "TCGA-UVM",
354     "doc_count": 80
355 },
356 {
357     "case_summary": {
358         "case_with_ssm": {
359             "doc_count": 0
360         },
361         "doc_count": 163
362     },
363     "key": "TARGET-RT",
364     "doc_count": 75
365 },
366 {
367     "case_summary": {
368         "case_with_ssm": {
369             "doc_count": 48

```

```

370     },
371     "doc_count": 346
372   },
373   "key": "TCGA-DLBC",
374   "doc_count": 58
375 },
376 {
377   "case_summary": {
378     "case_with_ssm": {
379       "doc_count": 57
380     },
381     "doc_count": 399
382   },
383   "key": "TCGA-UCS",
384   "doc_count": 57
385 },
386 {
387   "case_summary": {
388     "case_with_ssm": {
389       "doc_count": 51
390     },
391     "doc_count": 306
392   },
393   "key": "TCGA-CHOL",
394   "doc_count": 51
395 },
396 {
397   "case_summary": {
398     "case_with_ssm": {
399       "doc_count": 0
400     },
401     "doc_count": 13
402   },
403   "key": "TARGET-CCSK",
404   "doc_count": 13
405 }
406 ],
407 "sum_other_doc_count": 0,
408 "doc_count_error_upper_bound": 0
409 }
410 },
411 "timed_out": false
412 }

```

Survival Analysis Endpoint

[Survival plots](#) are generated for different subsets of data, based on variants or projects, in the GDC Data Portal. The `/analysis/survival` endpoint can be used to programmatically retrieve the raw data used to generate these plots and apply different filters. Note that the `fields` and `format` parameters cannot be modified.

Example 1: A user wants to download data to generate a survival plot for cases from the project TCGA-DLBC.

```

1 curl
   "https://api.gdc.cancer.gov/analysis/survival?filters=%5B%7B%22op%22%3A%22%3D%22%2C%22content%22%3A%7B%22fie

1 {
2   "overallStats": {},
3   "results": [

```

```

4 {
5   "donors": [
6     {
7       "survivalEstimate": 1,
8       "id": "dc87a809-95de-4eb7-a1c2-2650475f2d7e",
9       "censored": true,
10      "time": 1
11    },
12    {
13      "survivalEstimate": 1,
14      "id": "4dd86ebd-ef16-4b2b-9ea0-5d1d7afef257",
15      "censored": true,
16      "time": 17
17    },
18    {
19      "survivalEstimate": 1,
20      "id": "0bf573ac-cd1e-42d8-90cf-b30d7b08679c",
21      "censored": false,
22      "time": 58
23    },
24    {
25      "survivalEstimate": 0.9777777777777777,
26      "id": "f978cb0f-d319-4c01-b4c5-23ae1403a106",
27      "censored": true,
28      "time": 126
29    },
30    {
31      "survivalEstimate": 0.9777777777777777,
32      "id": "a43e5f0e-a21f-48d8-97e0-084d413680b7",
33      "censored": true,
34      "time": 132
35    },
36    {
37      "survivalEstimate": 0.9777777777777777,
38      "id": "1843c82e-7a35-474f-9f79-c0a9af9aa09c",
39      "censored": true,
40      "time": 132
41    },
42    {
43      "survivalEstimate": 0.9777777777777777,
44      "id": "0030a28c-81aa-44b0-8be0-b35e1dcbf98c",
45      "censored": false,
46      "time": 248
47    },
48    {
49      "survivalEstimate": 0.9539295392953929,
50      "id": "f553f1a9-ecf2-4783-a609-6adca7c4c597",
51      "censored": true,
52      "time": 298
53    },
54    {
55      "survivalEstimate": 0.9539295392953929,
56      "id": "f784bc3a-751b-4025-aab2-0af2f6f24266",
57      "censored": false,
58      "time": 313
59    },
60    {
61      "survivalEstimate": 0.929469807518588,

```

```

62     "id": "29e3d122-15a1-4235-a356-b1a9f94ceb39",
63     "censored": true,
64     "time": 385
65 },
66 {
67     "survivalEstimate": 0.929469807518588,
68     "id": "0e251c03-bf86-4ed8-b45d-3cbc97160502",
69     "censored": false,
70     "time": 391
71 },
72 {
73     "survivalEstimate": 0.9043490019099776,
74     "id": "e6365b38-bc44-400c-b4aa-18ce8ff5bfce",
75     "censored": true,
76     "time": 427
77 },
78 {
79     "survivalEstimate": 0.9043490019099776,
80     "id": "b56bdbdb-43af-4a03-a072-54dd22d7550c",
81     "censored": true,
82     "time": 553
83 },
84 {
85     "survivalEstimate": 0.9043490019099776,
86     "id": "31bbad4e-3789-42ec-9faa-1cb86970f723",
87     "censored": false,
88     "time": 595
89 },
90 {
91     "survivalEstimate": 0.8777505018538018,
92     "id": "0e9fcccc-0630-408d-a121-2c6413824cb7",
93     "censored": true,
94     "time": 679
95 },
96 {
97     "survivalEstimate": 0.8777505018538018,
98     "id": "a5b188f0-a6d3-4d4a-b04f-36d47ec05338",
99     "censored": false,
100    "time": 708
101 },
102 {
103    "survivalEstimate": 0.8503207986708705,
104    "id": "ed746cb9-0f2f-48ce-923a-3a9f9f00b331",
105    "censored": true,
106    "time": 719
107 },
108 {
109    "survivalEstimate": 0.8503207986708705,
110    "id": "c85f340e-584b-4f3b-b6a5-540491fc8ad2",
111    "censored": true,
112    "time": 730
113 },
114 {
115    "survivalEstimate": 0.8503207986708705,
116    "id": "69f23725-adca-48ac-9b33-80a7aae24cfe",
117    "censored": true,
118    "time": 749
119 },

```

```

120 {
121   "survivalEstimate": 0.8503207986708705,
122   "id": "67325322-483f-443f-9ffa-2a20d108a2fb",
123   "censored": true,
124   "time": 751
125 },
126 {
127   "survivalEstimate": 0.8503207986708705,
128   "id": "eda9496e-be80-4a13-bf06-89f0cc9e937f",
129   "censored": true,
130   "time": 765
131 },
132 {
133   "survivalEstimate": 0.8503207986708705,
134   "id": "25ff86af-beb4-480c-b706-f3fe0306f7cf",
135   "censored": true,
136   "time": 788
137 },
138 {
139   "survivalEstimate": 0.8503207986708705,
140   "id": "1d0db5d7-39ca-466d-96b3-0d278c5ea768",
141   "censored": true,
142   "time": 791
143 },
144 {
145   "survivalEstimate": 0.8503207986708705,
146   "id": "c8cde9ea-89e9-4ee8-8a46-417a48f6d3ab",
147   "censored": true,
148   "time": 832
149 },
150 {
151   "survivalEstimate": 0.8503207986708705,
152   "id": "f0a326d2-1f3e-4a5d-bca8-32aacc52338",
153   "censored": true,
154   "time": 946
155 },
156 {
157   "survivalEstimate": 0.8503207986708705,
158   "id": "a8e2df1e-4042-42af-9231-3a00e83489f0",
159   "censored": true,
160   "time": 965
161 },
162 {
163   "survivalEstimate": 0.8503207986708705,
164   "id": "e56e4d9c-052e-4ec6-a81b-dbd53e9c8ffe",
165   "censored": true,
166   "time": 972
167 },
168 {
169   "survivalEstimate": 0.8503207986708705,
170   "id": "45b0cf9f-a879-417f-8f39-7770552252c0",
171   "censored": true,
172   "time": 982
173 },
174 {
175   "survivalEstimate": 0.8503207986708705,
176   "id": "1f971af1-6772-4fe6-8d35-bbe527a037fe",
177   "censored": true,

```



```

178     "time": 1081
179 },
180 {
181     "survivalEstimate": 0.8503207986708705,
182     "id": "33365d22-cb83-4d8e-a2d1-06b675f75f6e",
183     "censored": true,
184     "time": 1163
185 },
186 {
187     "survivalEstimate": 0.8503207986708705,
188     "id": "6a21c948-cd85-4150-8c01-83017d7dc1ed",
189     "censored": false,
190     "time": 1252
191 },
192 {
193     "survivalEstimate": 0.8003019281608192,
194     "id": "f855dad1-6ffc-493e-ba6c-970874bc9210",
195     "censored": true,
196     "time": 1299
197 },
198 {
199     "survivalEstimate": 0.8003019281608192,
200     "id": "c1c06604-5ae2-4a53-b9c0-eb210d38e3f0",
201     "censored": true,
202     "time": 1334
203 },
204 {
205     "survivalEstimate": 0.8003019281608192,
206     "id": "58e66976-4507-4552-ac53-83a49a142dde",
207     "censored": true,
208     "time": 1373
209 },
210 {
211     "survivalEstimate": 0.8003019281608192,
212     "id": "ea54dbad-1b23-41cc-9378-d4002a8fca51",
213     "censored": true,
214     "time": 1581
215 },
216 {
217     "survivalEstimate": 0.8003019281608192,
218     "id": "d7df78b5-24f1-4ff4-bd9b-f0e6bec8289a",
219     "censored": true,
220     "time": 1581
221 },
222 {
223     "survivalEstimate": 0.8003019281608192,
224     "id": "29aff186-c321-4ff9-b81b-105e27e620ff",
225     "censored": true,
226     "time": 1617
227 },
228 {
229     "survivalEstimate": 0.8003019281608192,
230     "id": "5eff68ff-f6c3-40c9-9fc8-00e684a7b712",
231     "censored": true,
232     "time": 1739
233 },
234 {
235     "survivalEstimate": 0.8003019281608192,

```

```

236     "id": "f8cf647b-1447-4ac3-8c43-bef07765cabf",
237     "censored": true,
238     "time": 2131
239 },
240 {
241     "survivalEstimate": 0.8003019281608192,
242     "id": "c3d662ee-48d0-454a-bb0c-77d3338d3747",
243     "censored": true,
244     "time": 2983
245 },
246 {
247     "survivalEstimate": 0.8003019281608192,
248     "id": "6e9437f0-a4ed-475c-ab0e-bf1431c70a90",
249     "censored": true,
250     "time": 3333
251 },
252 {
253     "survivalEstimate": 0.8003019281608192,
254     "id": "fdecbb74f-ac4e-46b1-b23a-5f7fde96ef9f",
255     "censored": true,
256     "time": 3394
257 },
258 {
259     "survivalEstimate": 0.8003019281608192,
260     "id": "a468e725-ad4b-411d-ac5c-2eacc68ec580",
261     "censored": false,
262     "time": 3553
263 },
264 {
265     "survivalEstimate": 0.6402415425286554,
266     "id": "1ea575f1-f731-408b-a629-f5f4abab569e",
267     "censored": true,
268     "time": 3897
269 },
270 {
271     "survivalEstimate": 0.6402415425286554,
272     "id": "7a589441-11ef-4158-87e7-3951d86bc2aa",
273     "censored": true,
274     "time": 4578
275 },
276 {
277     "survivalEstimate": 0.6402415425286554,
278     "id": "3622cf29-600f-4410-84d4-a9afeb41c475",
279     "censored": true,
280     "time": 5980
281 },
282 {
283     "survivalEstimate": 0.6402415425286554,
284     "id": "3f5a897d-1eaa-4d4c-8324-27ac07c90927",
285     "censored": false,
286     "time": 6425
287 }
288 ],
289 "meta": {
290     "id": 140429063094496
291 }
292 }
293 ]

```

```
294 }
```

Example 2: Here the survival endpoint is used to compare two survival plots for TCGA-BRCA cases. One plot will display survival information about cases with a particular mutation (in this instance: chr3:g.179234297A>G) and the other plot will display information about cases without that mutation. This type of query will also print the results of a chi-squared analysis between the two subsets of cases.

```
1 [
2   {
3     "op": "and",
4     "content": [
5       {
6         "op": "=",
7         "content": {
8           "field": "cases.project.project_id",
9           "value": "TCGA-BRCA"
10        }
11      },
12      {
13        "op": "=",
14        "content": {
15          "field": "gene.ssm.ssm_id",
16          "value": "edd1ae2c-3ca9-52bd-a124-b09ed304fcc2"
17        }
18      }
19    ]
20  },
21  {
22    "op": "and",
23    "content": [
24      {
25        "op": "=",
26        "content": {
27          "field": "cases.project.project_id",
28          "value": "TCGA-BRCA"
29        }
30      },
31      {
32        "op": "excludeifany",
33        "content": {
34          "field": "gene.ssm.ssm_id",
35          "value": "edd1ae2c-3ca9-52bd-a124-b09ed304fcc2"
36        }
37      }
38    ]
39  }
40 ]
```

```
1 curl
   "https://api.gdc.cancer.gov/analysis/survival?filters=%5B%7B%22op%22%3A%22and%22%2C%22content%22%3A%5B%7B%22
```

```
1 {
2   "overallStats": {
3     "degreesFreedom": 1,
4     "chiSquared": 0.8577589072612264,
5     "pValue": 0.35436660628146011
6   },
7   "results": [
8     {
```

```

9     "donors": [
10         {
11             "survivalEstimate": 1,
12             "id": "a991644b-3ee6-4cda-acf0-e37de48a49fc",
13             "censored": true,
14             "time": 10
15         },
16         {
17             "survivalEstimate": 1,
18             "id": "2e1e3bf0-1708-4b65-936c-48b89eb8966a",
19             "censored": true,
20             "time": 19
21         },
22     (truncated)
23 ],
24 "meta": {
25     "id": 140055251282040
26 }
27 },
28 {
29     "donors": [
30         {
31             "survivalEstimate": 1,
32             "id": "5e4187c9-98f8-4bdb-a8da-6a914e96f47a",
33             "censored": true,
34             "time": -31
35         },
36     (truncated)

```

The output represents two sets of coordinates delimited as objects with the `donors` tag. One set of coordinates will generate a survival plot representing TCGA-BRCA cases that have the mutation of interest and the other will generate a survival plot for the remaining cases in TCGA-BRCA.

Example 3: Custom survival plots can be generated using the GDC API. For example, a user could generate survival plot data comparing patients with a mutation in genes associated with a biological pathway with patients without mutations in that pathway. The following example compares a patient with at least one mutation in either gene ENSG00000141510 or ENSG00000155657 with patients that do not have mutations in these genes.

```

1 [
2     {
3         "op": "and",
4         "content": [
5             {
6                 "op": "=",
7                 "content": {
8                     "field": "cases.project.project_id",
9                     "value": "TCGA-BRCA"
10                }
11            },
12            {
13                "op": "=",
14                "content": {
15                    "field": "gene.gene_id",
16                    "value": ["ENSG00000141510", "ENSG00000155657"]
17                }
18            }
19        ]
20    },
21    {

```

```

22     "op": "and",
23     "content": [
24         {
25             "op": "=",
26             "content": {
27                 "field": "cases.project.project_id",
28                 "value": "TCGA-BRCA"
29             }
30         },
31         {
32             "op": "excludeifany",
33             "content": {
34                 "field": "gene.gene_id",
35                 "value": ["ENSG00000141510", "ENSG00000155657"]
36             }
37         }
38     ]
39 }
40 ]

```

```

1 curl
  "https://api.gdc.cancer.gov/analysis/survival?filters=%5B%0D%0A%7B%0D%0A%22op%22%3A%22and%22%2C%0D%0A%22cont

```

Example 4: Survival plots can be even more customizable when sets of case IDs are used. Two sets of case IDs (or barcodes) can be retrieved in a separate step based on custom criteria and compared in a survival plot. See below for an example query.

```

1 [{
2     "op": "=",
3     "content": {
4         "field": "cases.submitter_id",
5         "value": ["TCGA-HT-A74J", "TCGA-43-A56U", "TCGA-GM-A3XL", "TCGA-A1-A0SQ", "TCGA-K1-A6RV", "TCGA-J2-A4AD", "TCGA-X
6     }
7 },
8 {
9     "op": "=",
10    "content": {
11        "field": "cases.submitter_id",
12        "value": ["TCGA-55-5899", "TCGA-55-6642", "TCGA-55-7907", "TCGA-67-6216", "TCGA-75-5146", "TCGA-49-4510", "TCGA-7
13    }
14 }]

```

```

1 curl
  "https://api.gdc.cancer.gov/analysis/survival?filters=%5B%7B%22op%22%3A%22%3D%22%2C%22content%22%3A%7B%22fie

```

Chapter 5

BAM Slicing

BAM Slicing

The GDC API provides remote BAM slicing functionality that enables downloading of specific parts of a BAM file instead of the whole file. This functionality can be accessed at the `slicing` endpoint, using a syntax similar to that of widely used bioinformatics tools such as `samtools`.

About the slicing endpoint

The `slicing` endpoint accepts HTTP GET requests in the form of a URL, and HTTP POST requests that carry a JSON payload. POST requests are more appropriate in cases where query parameters make the GET URL very long.

The response will be a BAM-formatted file containing the header of the source BAM file, as well as any alignment records that are found to overlap the specified regions, sorted by chromosomal coordinate.

Please note the following:

- The functionality of this API differs from the usual functionality of `samtools` in that alignment records that overlap multiple regions will not be returned multiple times.
- A request with no region or gene specified will return the BAM header, which makes it easy to inspect the references to which the alignment records were aligned.
- A request for regions that are not included in the source BAM is not considered an error, and is treated the same as if no records existed for the region.
- Examples provided for BAM slicing functionality are intended for use with GDC harmonized data (i.e. BAM files available in the GDC Data Portal). Slicing of unharmonized BAM files (i.e. BAM files in the GDC Legacy Portal) is not supported.
- Bam slicing does not create an associated bam index (.bai) file. For applications requiring a .bai file users will need to generate this file from the bam slice using a tool and command such as `samtools index`.

Query Parameters

The following query parameters and JSON fields are supported:

Description	Query Parameter	JSON Field	Query format
entire chromosome, or a position or region on the chromosome, specified using chromosomal coordinates	region	regions	region=(:(-)?)?
region specified using a HGNC / GENCODE v22 gene name	gencode	gencode	gencode=

NOTE: The successfully sliced BAM will contain all reads that overlap (entirely or partially) with the specified region or gene. It is possible to specify an open-ended region, e.g. `chr2:10000`, which would return all reads that (completely or partially) overlap with the region of chromosome 2 from position 10,000 to the end of the chromosome.

JSON Schema

JSON payloads can be syntactically verified using the following JSON schema:

```
1 {
2   "$schema": "http://json-schema.org/schema#",
3   "type": "object",
4   "properties": {
5     "regions": {
6       "type": "array",
7       "items": {
8         "type": "string",
9         "pattern": "^[a-zA-Z0-9]+(:([0-9]+)?(-[0-9]+)?)??$"
10      }
11    },
12    "gencode": {
13      "type": "array",
14      "items": {
15        "type": "string"
16      }
17    }
18  }
19 }
```

Examples: Specifying a region

The following two requests are examples of BAM slicing using region(s).

```
1
2 token=$(<gdc-token-text-file.txt)
3
4 curl --header "X-Auth-Token: $token"
   'https://api.gdc.cancer.gov/slicing/view/df80679e-c4d3-487b-934c-fcc782e5d46e?region=chr1&region=chr2:10000&'
   --output get_regions_slice.bam
```

```
1 {
2   "regions": [
3     "chr1",
4     "chr2:10000",
5     "chr3:10000-20000"
6   ]
7 }
```

```
1 token=$(<gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST
   https://api.gdc.cancer.gov/slicing/view/9ca90dfa-e62f-4f9c-9946-dfcecfd3ca4d --header "Content-Type:
   application/json" -d@Payload --output post_regions_slice.bam
```

```
1 Response:
2 HTTP/1.1 206
3
4 <bam_data_stream>
```

Examples: Specifying a gene

The following two requests are examples of BAM slicing using HGNC / GENCODE v22 gene name(s).

```
1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token"
   'https://api.gdc.cancer.gov/slicing/view/df80679e-c4d3-487b-934c-fcc782e5d46e?gencode=BRCA1' --output
   get_brca1_slice.bam
```

```
1 {
2   "gencode": [
3     "BRCA1",
4     "BRCA2"
5   ]
6 }
```

```
1 curl --header "X-Auth-Token: $token" --request POST
   https://api.gdc.cancer.gov/slicing/view/df80679e-c4d3-487b-934c-fcc782e5d46e --header "Content-Type:
   application/json" -d@Payload --output post_brca12_slice.bam
```

```
1 Response:
2 HTTP/1.1 206
3
4 <bam_data_stream>
```

After downloading, the sliced BAM file can be converted to SAM using the following command if **samtools** is installed on the user's system:

```
1 samtools view -h brca1_slice.bam -o brca1_slice.sam
```

Errors

When slicing cannot be performed, the GDC API will provide JSON error responses and HTTP error codes.

JSON Error Responses

JSON error responses have the following structure:

```
1 {
2   "error": "<error-message>"
3 }
```

For example, when making a request for a protected BAM without supplying a GDC authentication token:

```
1 curl https://api.gdc.cancer.gov/v0/slicing/view/15b0bf8e-ff20-41ab-8366-a495c11b30be
```

```
1 HTTP/1.1 403 FORBIDDEN
2 {
3   "error": "Please specify a X-Auth-Token"
4 }
```

HTTP error codes

Potential HTTP error codes include:

Error Code	Description
400	Bad Request – The regions specified are malformed
403	Unauthorized – The user could not be authenticated
403	Unauthorized – The user is not authorized for access to the source BAM
404	Not Found – No BAM is specified
404	Not Found – No BAM can be found for the specified GDC BAM ID
504	BAI Not Found – No BAI can be found for the BAM

Transfer Errors

In the case that an error occurs during transfer of the resulting BAM, the BGZF EOF marker will not be present. This early truncation of the BAM file will cause errors if the file is used as input to other programs. For example, **samtools** will provide the error “EOF marker is absent”.

Early truncation can arise when connection is interrupted or when slicing fails due to BAM corruption.

Chapter 6

Submission

Submission

Overview

The GDC Submission API uses methods and endpoints that are distinct from those that drive the functionality of the GDC Data Portal. In particular, data and metadata that are in the process of being submitted can only be queried using GraphQL.

This section describes the GDC API's submission functionality, including methods for submitting, deleting, updating, searching, and retrieving data and metadata.

Submission endpoint

Constructing the endpoint URL

The endpoint for submitting data to a specific project in the GDC is constructed as follows:

```
1 https://api.gdc.cancer.gov/[API_version/]submission/Program.name/Project.code
```

where **API_version/** is the optional API version component (see [Getting Started]).

The values of **Program.name** and **Project.code** can be obtained from the project URL on the GDC Data Submission Portal:

```
1 https://portal.gdc.cancer.gov/submission/Program.name/Project.code/dashboard
```

For more information about program name and project code see [The GDC Data Model section](#).

Example

The following are URL examples for a project with **Program.name** “TCGA” and **Project.code** “ALCH”:

- Submission Portal URL: <https://portal.gdc.cancer.gov/submission/TCGA/ALCH/dashboard>
- API submission endpoint (versioned): <https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH>
- API submission endpoint (unversioned): <https://api.gdc.cancer.gov/submission/TCGA/ALCH>

Submission Formats

Metadata Formats

JSON and TSV

The GDC API accepts project metadata in JSON and TSV formats for the purpose of creating entities in the GDC Data Model. This includes clinical and biospecimen metadata such as disease name and stage, patient age, sample type, and certain details about the types of data collected. Upon successful data submission and project release, this metadata is indexed and becomes available for queries by data users via the GDC Data Portal and the GDC API. See [GDC Data Model](#) (below) for information on accepted metadata elements and instructions for obtaining templates for metadata submission.

Content-Type Header JSON is the default format for metadata submission. Submission API calls with JSON payloads should include the HTTP header `Content-Type: application/json`. Requests with TSV payloads must instead include the header `Content-Type: text/tsv`.

Binary Mode Metadata files must be uploaded in raw, unencoded form. Binary mode should be used, if available, to ensure that file contents are not encoded by the upload tool before transmission. For example, when using the `curl` command-line tool, the `--data-binary` switch should be used instead of `--data`. The `--data-binary` switch is required for uploading TSV files.

BCR XML

While JSON and TSV are the recommended formats for submitting metadata, the GDC API can also extract metadata elements from BCR XML files. Users wishing to submit metadata as BCR XML must contact GDC User Services and ensure that appropriate element mapping is in place before initiating XML submission.

To submit BCR XML, make PUT requests with the `Content-Type: application/xml` header to the following URLs, replacing `Program.name` and `Project.code` as described in Submission Endpoint (above):

0. For Biospecimen BCR XML: `https://api.gdc.cancer.gov/v0/submission/Program.name/Project.code/xml/biospecimen/`
1. For Clinical BCR XML: `https://api.gdc.cancer.gov/v0/submission/Program.name/Project.code/xml/clinical/bcr/`

Biospecimen BCR XML creates Case entities in the GDC Data Model, whereas Clinical BCR XML does not. Unless the associated cases already exist in the GDC, Biospecimen BCR XML must be uploaded before Clinical BCR XML.

BCR XML files can be submitted in dry run mode, described [below](#), by appending `_dry_run` to the above URLs.

The following is a sample shell command for submitting an XML file:

```
1 curl --request PUT --header "X-Auth-Token: $token" --header 'Content-Type: application/xml'
   --data-binary @biospecimen.xml
   'https://api.gdc.cancer.gov/v0/submission/GDC/INTERNAL/xml/biospecimen/bcr/_dry_run'
```

NOTE: A typical BCR XML file contains more information than what is extracted and indexed by the GDC. XML files submitted to the above endpoints are not retained or distributed to GDC data users, so the same files should also be submitted as data files (i.e. as clinical or biospecimen supplements).

Data File Formats

The GDC API accepts a variety of data files after their metadata has been registered: BAM and FASTQ files, clinical and biospecimen supplements, slide images, and other file types. Supported data file formats are listed on the [GDC website](#).

GDC Data Model

Submitters should review the GDC Data Model documentation and the GDC Data Dictionary before initiating submission.

UUIDs

Submitters can assign UUIDs to all submittable entities other than those that correspond to files (entities in categories `data_file` or `metadata_file`). If the submitter does not provide a UUID, it will be assigned by the GDC and returned in the API response upon successful completion of the submission transaction. See Appendix C for details of the API response format. To learn more about UUIDs see the [GDC Data Model documentation](#).

Submitter IDs

In addition to `id`, many entities also include a `submitter_id` field. This field can contain any string (e.g. a “barcode”) that the submitter wishes to use to identify the entity. Typically this string identifies a corresponding entry in submitter’s records. The GDC’s only requirement with respect to `submitter_id` is that it be a string that is unique for all entities within a project. The GDC Submission API requires a `submitter_id` for most entities.

Note: For `case` entities, `submitter_id` must correspond to a `submitted_subject_id` of a study participant registered with the project in dbGaP.

GDC Data Dictionary Endpoints

Information in the GDC Data Dictionary can be accessed programmatically as described below.

Submission Templates

Submission templates are accessible programmatically at the `templates` endpoint. Template format (`json`, `tsv` or `csv`) is specified using the `format` parameter.

For example, the JSON template for `case` entities can be obtained from:

```
1 https://api.gdc.cancer.gov/v0/submission/template/case?format=json
```

In addition to `case`, templates for the following entities can be downloaded

Biospecimen:

```
1 sample
2 portion
3 analyte
4 aliquot
5 read_group
```

Clinical:

```
1 slide
2 demographic
3 diagnosis
4 exposure
5 family_history
6 treatment
7 follow_up
```

Data Files:

```
1 analysis_metadata
2 biospecimen_supplement
3 clinical_supplement
4 experiment_metadata
5 pathology_report
6 run_metadata
7 slide_image
```

```
8 submitted_unaligned_reads
9 submitted_aligned_reads
10 submitted_genomic_profile
```

Entity JSON Schemas

The entire collection of GDC entity schemas can be downloaded from the `dictionary` endpoint:

```
1 https://api.gdc.cancer.gov/v0/submission/_dictionary/_all
```

Individual schemas can be downloaded by specifying entity type. For example, the JSON schema for `case` entities can be found at:

```
1 https://api.gdc.cancer.gov/v0/submission/_dictionary/case
```

Making Requests to the Submission API

Requests to create or update entities in the GDC must specify the entity `type`, the entity `id` or `submitter_id`, relationships (links) that the entity has to existing entities in the GDC Data Model, and entity properties as defined by the GDC Data Dictionary. To delete entities, only the `id` property is required. The general format of GDC API submission requests and responses is provided in Appendix C.

Submission Transactions

Submission of data to the GDC involves a series of transactions initiated by the submitter, that create and link entities according to the GDC Data Model. With the exception of `program`, which is an administrative entity created by the GDC, all new entities must be linked, at creation, to existing entities or to new entities being created in the same transaction. For example, a submitter cannot create a `portion` entity unless the submitter either (1) has previously created the corresponding `case` and `sample` entities, or (2) is creating those entities in the same transaction. This also means that entities cannot be deleted if they have “child” entities attached to them.

If multiple entities are being created and/or updated in a transaction, and an error is encountered for one of the entities, then the transaction will fail and no changes will be made to the GDC.

Dry Run Transactions

The `submission` endpoint provides a `_dry_run` mode that simulates submission transactions without making changes to the GDC. This mode is activated by appending `_dry_run` to the end of a submission endpoint.

The following is an example of a POST request, that simulates creating an entity in dry run mode:

```
1 {
2   "project_id": "TCGA-ALCH",
3   "type": "case",
4   "submitter_id": "TCGA-ALCH-000001",
5   "projects": {
6     "code": "ALCH"
7   }
8 }
```

```
1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST --data-binary @Request --header 'Content-Type:
   application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH/_dry_run
```

```

1 {
2   "cases_related_to_created_entities_count": 0,
3   "cases_related_to_updated_entities_count": 0,
4   "code": 200,
5   "created_entity_count": 1,
6   "entities": [
7     {
8       "action": "create",
9       "errors": [],
10      "id": "61f48d1c-9439-448c-a90c-d6dbe76b3654",
11      "related_cases": [],
12      "type": "case",
13      "unique_keys": [
14        {
15          "project_id": "TCGA-ALCH",
16          "submitter_id": "TCGA-ALCH-000001"
17        }
18      ],
19      "valid": true,
20      "warnings": []
21    }
22  ],
23  "entity_error_count": 0,
24  "message": "Transaction would have been successful. User selected dry run option, transaction aborted,
25            no data written to database.",
26  "success": true,
27  "transaction_id": null,
28  "transactional_error_count": 0,
29  "transactional_errors": [],
30  "updated_entity_count": 0
31 }

```

Dry Run Commit

For convenience, the GDC enables users to commit earlier `_dry_run` transactions instead of uploading the same data again to execute the changes. This `commit` action is allowed on transactions that (1) have not been previously committed and (2) were successful `_dry_run` transactions.

Note that the `commit` action is a separate transaction with its own transaction id, and it can be executed **asynchronously**. If the state of the submission project has changed in a way that would make the original `_dry_run` transaction invalid if it were run again (e.g. entities with the same `submitter_id` have since been created in another transaction), then the `commit` action will fail.

To commit a transaction, submit a POST or PUT request to `/submission/Program.name/Project.code/transactions/transaction_id`, replacing `Program.name`, `Project.code`, and `transaction_id` with values associated with the transaction.

```

1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST
4     https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH/transactions/467/commit?async=true

```

```

1 {
2   "code": 200,
3   "message": "Transaction submitted.",
4   "transaction_id": 468,
5 }

```

Dry Run Close

The GDC Submission API also provides a `close` action on `_dry_run` transactions. This `close` action is allowed on `_dry_run` transactions that have not been previously closed. Closing a `_dry_run` transaction prevents it from being committed in the future.

To close a transaction, submit a POST or PUT request to `/submission/Program.name/Project.code/transactions/transaction_id/` replacing `Program.name`, `Project.code`, and `transaction_id` with values associated with the transaction.

```
1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST
   https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH/transactions/467/close
```

```
1 {
2   "code": 200,
3   "message": "Closed transaction.",
4   "transaction_id": 467
5 }
```

Asynchronous Transactions

The `submission` endpoint provides an asynchronous mode that provides immediate response and executes submission transactions in the background. This mode is activated by appending `?async=true` to the end of a submission endpoint. The API will respond with the `transaction_id` which can be used to look up the result of the transaction at a later time via the GraphQL endpoint. If the server has too many asynchronous jobs scheduled already, your request to schedule a transaction may fail.

Example

The following is an example of a PUT request, that creates a case asynchronously:

```
1 {
2   "project_id": "TCGA-ALCH",
3   "type": "case",
4   "submitter_id": "TCGA-ALCH-000001",
5   "projects": {
6     "code": "ALCH"
7   }
8 }
```

```
1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST --data-binary @Request --header 'Content-Type:
   application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH?async=true
```

```
1 {
2   "code": 200,
3   "message": "Transaction submitted.",
4   "transaction_id": 467,
5 }
```

The following is a GraphQL request that looks up the state of the above transaction:

```
1 query {
2   transaction_log(id: 467) {
3     is_dry_run
4     committed_by
5     state
6   }
7 }
```

```

1 {
2   "data": {
3     "transaction_log": [
4       {
5         "committed_by": null,
6         "is_dry_run": false,
7         "state": "FAILED"
8       }
9     ]
10  }
11 }

```

Transaction Status

The following transaction fields can be queried using GraphQL and are helpful in determining the status of a transaction:

Field	Type	Description
id	ID	Transaction identifier
is_dry_run	Boolean	Indicates whether the transaction is a dry run
closed	Boolean	For dry run transactions, indicates whether the transaction has been closed to prevent it from being committed in the future.
committable	Boolean	Indicates whether the transaction can be committed (i.e. it is a successful dry run transaction that has not been committed previously and has not been closed)
state	String	Indicates the state of the transaction: PENDING , SUCCEEDED , FAILED (due to user error), or ERRORED (due to system error)
committed_by	ID	The ID of the transaction that committed this transaction

Note: To check whether a dry run transaction was committed successfully, check the **state** of the transaction that executed the commit. The **state** of the dry run transaction itself does not represent the status of a subsequent commit.

Creating and Updating Entities

The GDC Submission API supports HTTP POST and HTTP PUT methods for creating entities:

- **POST** will create entities that do not exist, and will fail if any of the entities in the transaction already exist in the GDC.
- **PUT** will create new entities and update existing entities, and identify which entities were created or updated in the API response.

The GDC suggests using POST for creating new entities, and using PUT only for updating entities. This helps to avoid inadvertent entity updates that can occur when using PUT for creating entities.

Note: Once a relationship has been created between two entities, it cannot be removed by updating an entity. To remove a relationship, the child entity must be **deleted**.

Example: Creating and Updating Case Entities (JSON)

In this example, a case entity is created using POST. Then an attempt is made to create the same entity again using POST, resulting in an error. Then the originally created entity is updated (with the same information) using PUT.

The JSON in the request was generated using the **case** JSON template that can be obtained from the GDC Data Dictionary Viewer and from <https://api.gdc.cancer.gov/v0/submission/template/case?format=json>.

Note: For case entities, `submitter_id` must correspond to a `submitted_subject_id` of a study participant registered with the project in dbGaP.

```
1 {
2   "type": "case",
3   "submitter_id": "TCGA-ALCH-000001",
4   "projects": {
5     "code": "ALCH"
6   }
7
8 }
```

```
1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST --data-binary @Request --header 'Content-Type:
  application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH
```

```
1 {
2   "cases_related_to_created_entities_count": 0,
3   "cases_related_to_updated_entities_count": 0,
4   "code": 201,
5   "created_entity_count": 1,
6   "entities": [
7     {
8       "action": "create",
9       "errors": [],
10      "id": "fbf69646-5904-4f95-92d6-692bde658f05",
11      "related_cases": [],
12      "type": "case",
13      "unique_keys": [
14        {
15          "project_id": "TCGA-ALCH",
16          "submitter_id": "TCGA-ALCH-000001"
17        }
18      ],
19      "valid": true,
20      "warnings": []
21    }
22  ],
23   "entity_error_count": 0,
24   "message": "Transaction successful.",
25   "success": true,
26   "transaction_id": 215,
27   "transactional_error_count": 0,
28   "transactional_errors": [],
29   "updated_entity_count": 0
30 }
```

```
1 curl --header "X-Auth-Token: $token" --request POST --data-binary @Request --header 'Content-Type:
  application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH
```

```
1 {
2   "cases_related_to_created_entities_count": 0,
3   "cases_related_to_updated_entities_count": 0,
4   "code": 400,
5   "created_entity_count": 0,
6   "entities": [
7     {
8       "action": null,
```

```

9     "errors": [
10         {
11             "keys": [
12                 "id"
13             ],
14             "message": "Cannot create entity that already exists. Try updating entity (PUT instead of
15                 POST)",
16             "type": "NOT_UNIQUE"
17         }
18     ],
19     "id": null,
20     "related_cases": [],
21     "type": "case",
22     "unique_keys": [
23         {
24             "project_id": "TCGA-ALCH",
25             "submitter_id": "TCGA-ALCH-000001"
26         }
27     ],
28     "valid": false,
29     "warnings": []
30 },
31 "entity_error_count": 1,
32 "message": "Transaction aborted due to 1 invalid entity.",
33 "success": false,
34 "transaction_id": null,
35 "transactional_error_count": 0,
36 "transactional_errors": [],
37 "updated_entity_count": 0
38 }

```

```

1 curl --header "X-Auth-Token: $token" --request PUT --data-binary @Request --header 'Content-Type:
   application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH

```

```

1 {
2     "cases_related_to_created_entities_count": 0,
3     "cases_related_to_updated_entities_count": 0,
4     "code": 200,
5     "created_entity_count": 0,
6     "entities": [
7         {
8             "action": "update",
9             "errors": [],
10            "id": "fbf69646-5904-4f95-92d6-692bde658f05",
11            "related_cases": [],
12            "type": "case",
13            "unique_keys": [
14                {
15                    "project_id": "TCGA-ALCH",
16                    "submitter_id": "TCGA-ALCH-000001"
17                }
18            ],
19            "valid": true,
20            "warnings": []
21        }
22    ],
23    "entity_error_count": 0,

```

```

24 "message": "Transaction successful.",
25 "success": true,
26 "transaction_id": 216,
27 "transactional_error_count": 0,
28 "transactional_errors": [],
29 "updated_entity_count": 1
30 }

```

Example: Creating an Aliquot Entity (JSON)

In this example, an aliquot entity and a sample entity are created in a single transaction. The aliquot is linked to sample which is linked to case. The first request is an example of using submitter_id properties to link entities together. The second request is an example of using UUIDs for creating the links.

Request 1: Creating Links Using submitter_id

```

1 [
2   {
3     "type": "sample",
4     "submitter_id": "TCGA-ALCH-000001-SAMPLE000001",
5     "sample_type": "Primary Tumor",
6     "sample_type_id": "01",
7     "cases": {
8       "submitter_id": "TCGA-ALCH-000001"
9     }
10  },
11  {
12    "type": "aliquot",
13    "submitter_id": "TCGA-ALCH-000001-SAMPLE000001-ALQUOT000001",
14    "samples": {
15      "submitter_id": "TCGA-ALCH-000001-SAMPLE000001"
16    }
17  }
18 ]

```

```

1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST --data-binary @Request --header 'Content-Type:
  application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH

```

```

1 {
2   "cases_related_to_created_entities_count": 1,
3   "cases_related_to_updated_entities_count": 0,
4   "code": 201,
5   "created_entity_count": 2,
6   "entities": [
7     {
8       "action": "create",
9       "errors": [],
10      "id": "48270338-6464-448f-bbef-b09d4f80b11b",
11      "related_cases": [
12        {
13          "id": "fbf69646-5904-4f95-92d6-692bde658f05",
14          "submitter_id": "TCGA-ALCH-000001"
15        }
16      ],

```

```

17     "type": "sample",
18     "unique_keys": [
19         {
20             "project_id": "TCGA-ALCH",
21             "submitter_id": "TCGA-ALCH-000001-SAMPLE000001"
22         }
23     ],
24     "valid": true,
25     "warnings": []
26 },
27 {
28     "action": "create",
29     "errors": [],
30     "id": "7af58da0-cb3e-43e2-a074-4bd8f27565ba",
31     "related_cases": [
32         {
33             "id": "fbf69646-5904-4f95-92d6-692bde658f05",
34             "submitter_id": "TCGA-ALCH-000001"
35         }
36     ],
37     "type": "aliquot",
38     "unique_keys": [
39         {
40             "project_id": "TCGA-ALCH",
41             "submitter_id": "TCGA-ALCH-000001-SAMPLE000001-ALIQUOT000001"
42         }
43     ],
44     "valid": true,
45     "warnings": []
46 }
47 ],
48 "entity_error_count": 0,
49 "message": "Transaction successful.",
50 "success": true,
51 "transaction_id": 222,
52 "transactional_error_count": 0,
53 "transactional_errors": [],
54 "updated_entity_count": 0
55 }

```

Request 2: Creating Links Using UUID

```

1 [
2     {
3         "type": "sample",
4         "submitter_id": "TCGA-ALCH-000001-SAMPLE000001",
5         "id": "2aa7a07b-e706-4eef-ae8a-b849972423a0",
6         "sample_type": "Primary Tumor",
7         "sample_type_id": "01",
8         "cases": {
9             "id": "fbf69646-5904-4f95-92d6-692bde658f05"
10        }
11    },
12    {
13        "type": "aliquot",
14        "submitter_id": "TCGA-ALCH-000001-SAMPLE000001-ALIQUOT000001",
15        "samples": {
16            "id": "2aa7a07b-e706-4eef-ae8a-b849972423a0"

```

```

17     }
18 }
19 ]

1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request POST --data-binary @Request --header 'Content-Type:
  application/json' https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH

1 {
2   "cases_related_to_created_entities_count": 1,
3   "cases_related_to_updated_entities_count": 0,
4   "code": 201,
5   "created_entity_count": 2,
6   "entities": [
7     {
8       "action": "create",
9       "errors": [],
10      "id": "2aa7a07b-e706-4eef-ae8a-b849972423a0",
11      "related_cases": [
12        {
13          "id": "fbf69646-5904-4f95-92d6-692bde658f05",
14          "submitter_id": "TCGA-ALCH-000001"
15        }
16      ],
17      "type": "sample",
18      "unique_keys": [
19        {
20          "project_id": "TCGA-ALCH",
21          "submitter_id": "TCGA-ALCH-000001-SAMPLE000001"
22        }
23      ],
24      "valid": true,
25      "warnings": []
26    },
27    {
28      "action": "create",
29      "errors": [],
30      "id": "545096d5-ce1c-433f-80f0-fd0b04b56cb6",
31      "related_cases": [
32        {
33          "id": "fbf69646-5904-4f95-92d6-692bde658f05",
34          "submitter_id": "TCGA-ALCH-000001"
35        }
36      ],
37      "type": "aliquot",
38      "unique_keys": [
39        {
40          "project_id": "TCGA-ALCH",
41          "submitter_id": "TCGA-ALCH-000001-SAMPLE000001-ALIQUOT000001"
42        }
43      ],
44      "valid": true,
45      "warnings": []
46    }
47  ],
48  "entity_error_count": 0,
49  "message": "Transaction successful."

```

```

50 "success": true,
51 "transaction_id": 219,
52 "transactional_error_count": 0,
53 "transactional_errors": [],
54 "updated_entity_count": 0
55 }

```

Example: Creating Two Samples (TSV)

In this example, a TSV file containing metadata for two samples is uploaded to the GDC in dry run mode.

```

1 type      project_id  submitter_id  cases.submitter_id  sample_type  sample_type_id  tumor_descriptor
2 sample    GDC-INTERNAL  GDC-INTERNAL-000022-sampleA  GDC-INTERNAL-000022  Additional Metastatic  01
3 sample    GDC-INTERNAL  GDC-INTERNAL-000022-sampleB  GDC-INTERNAL-000022  Solid Tissue Normal  02

```

```

1 curl --header "X-Auth-Token: $token" --header 'Content-Type: text/tsv' --request PUT --data-binary
   @Samples.tsv 'https://api.gdc.cancer.gov/submission/GDC/INTERNAL/_dry_run'

```

```

1 {
2   "cases_related_to_created_entities_count": 1,
3   "cases_related_to_updated_entities_count": 0,
4   "code": 200,
5   "created_entity_count": 2,
6   "entities": [
7     {
8       "action": "create",
9       "errors": [],
10      "id": "b55e10af-5b7f-48f1-b230-0f8e6b7a7afe",
11      "related_cases": [
12        {
13          "id": "6e2e3b31-c5d2-45df-a911-eb3577640b70",
14          "submitter_id": "GDC-INTERNAL-000022"
15        }
16      ],
17      "type": "sample",
18      "unique_keys": [
19        {
20          "project_id": "GDC-INTERNAL",
21          "submitter_id": "GDC-INTERNAL-000022-sampleA"
22        }
23      ],
24      "valid": true,
25      "warnings": []
26    },
27    {
28      "action": "create",
29      "errors": [],
30      "id": "15076660-fccc-4406-b981-c745eb992034",
31      "related_cases": [
32        {
33          "id": "6e2e3b31-c5d2-45df-a911-eb3577640b70",
34          "submitter_id": "GDC-INTERNAL-000022"
35        }
36      ],
37      "type": "sample",
38      "unique_keys": [
39        {
40          "project_id": "GDC-INTERNAL",

```

```

41     "submitter_id": "GDC-INTERNAL-000022-sampleB"
42   }
43 ],
44   "valid": true,
45   "warnings": []
46 }
47 ],
48 "entity_error_count": 0,
49 "message": "Transaction would have been successful. User selected dry run option, transaction aborted,
50   no data written to database.",
51 "success": true,
52 "transaction_id": 51284,
53 "transactional_error_count": 0,
54 "transactional_errors": [],
55 "updated_entity_count": 0
56 }

```

Retrieving Entities

Entities Endpoint

JSON objects representing submitted entities can be retrieved with a GET request to the `entities` endpoint. This endpoint retrieves entities by UUID. A single UUID or a comma-separated list of UUIDs can be passed to this endpoint as a query.

```

1 token=$(cat gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token"
   https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH/entities/fbf69646-5904-4f95-92d6-692bde658f05

```

```

1 {
2   "entities": [
3     {
4       "program": "TCGA",
5       "project": "ALCH",
6       "properties": {
7         "created_datetime": "2016-04-14T08:44:43.361800-05:00",
8         "id": "fbf69646-5904-4f95-92d6-692bde658f05",
9         "project_id": "TCGA-ALCH",
10        "projects": [
11          {
12            "id": "d9906779-f1da-5d9f-9caa-6d5ecb2e3cd6",
13            "submitter_id": null
14          }
15        ],
16        "state": "validated",
17        "submitter_id": "TCGA-ALCH-000001",
18        "type": "case",
19        "updated_datetime": "2016-04-14T21:29:28.401212-05:00"
20      }
21    ]
22  }
23 }

```

Export Endpoint

The **export** endpoint provides additional functionality for exporting entities from the GDC submission system. The **ids** parameter accepts a UUID or a comma-separated list of UUIDs. The **format** parameter allows the user to specify the preferred format of the API response: JSON, TSV, or CSV. When the **with_children** parameter is set to **with_children**, the response includes the metadata stored in all “child” entities of the entity being requested. The **export** endpoint accepts GET requests.

```
1 token=$(cat gdc-token-text-file.txt)
2
3
4 curl --header "X-Auth-Token: $token"
   'https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH/export?ids=11f8321-832f-4a8b-8384-a2f6256557e0&format=json'
```

```
1 {
2   "case": [
3     {
4       "tissue_source_sites": [],
5       "submitter_id": "TCGA-ALCH-000026",
6       "project_id": "TCGA-ALCH",
7       "type": "case",
8       "id": "11f83251-832f-4a8b-8384-a2f6256557e0",
9       "projects": [
10        {
11          "code": "ALCH",
12          "id": "d9906779-f1da-5d9f-9caa-6d5ecb2e3cd6"
13        }
14      ]
15    }
16  ],
17  "sample": [
18    {
19      "sample_type_id": "10",
20      "time_between_excision_and_freezing": null,
21      "oct_embedded": "false",
22      "tumor_code_id": null,
23      "submitter_id": "Blood-00001_api26",
24      "intermediate_dimension": null,
25      "id": "23308708-6a63-471e-947c-6a93c6e85983",
26      "time_between_clamping_and_freezing": null,
27      "pathology_report_uuid": null,
28      "tumor_descriptor": null,
29      "sample_type": "Blood Derived Normal",
30      "project_id": "TCGA-ALCH",
31      "current_weight": null,
32      "composition": null,
33      "is_ffpe": null,
34      "shortest_dimension": null,
35      "tumor_code": null,
36      "tissue_type": null,
37      "days_to_sample_procurement": null,
38      "cases": [
39        {
40          "id": "11f83251-832f-4a8b-8384-a2f6256557e0",
41          "submitter_id": "TCGA-ALCH-000026"
42        }
43      ],
44      "freezing_method": null,
45      "type": "sample",
46      "preservation_method": null,
```



```

47     "days_to_collection": null,
48     "initial_weight": null,
49     "longest_dimension": null
50   }
51 ],
52 "read_group": [
53   {
54     "library_name": "Solexa-34688",
55     "is_paired_end": true,
56     "size_selection_range": null,
57     "adapter_sequence": null,
58     "library_strand": null,
59     "submitter_id": "Blood-00001-aliquot_lane1_barcode26",
60     "library_preparation_kit_name": null,
61     "adapter_name": null,
62     "target_capture_kit_name": null,
63     "includes_spike_ins": null,
64     "library_preparation_kit_version": null,
65     "id": "90163202-cfd7-4f6a-8214-e7e4e924d3a6",
66     "spike_ins_concentration": null,
67     "target_capture_kit_vendor": null,
68     "read_length": 75,
69     "sequencing_date": "2010-08-04",
70     "spike_ins_fasta": null,
71     "to_trim_adapter_sequence": null,
72     "RIN": null,
73     "platform": "Illumina",
74     "library_selection": "Hybrid_Selection",
75     "library_strategy": "WXS",
76     "library_preparation_kit_catalog_number": null,
77     "target_capture_kit_target_region": null,
78     "fastq_name": null,
79     "target_capture_kit_version": null,
80     "aliquots": [
81       {
82         "id": "e66dee54-5f4c-4471-9e08-dba0f6cdaaa4",
83         "submitter_id": "Blood-00001-aliquot26"
84       }
85     ],
86     "read_group_name": "205DD.3-2",
87     "library_preparation_kit_vendor": null,
88     "project_id": "TCGA-ALCH",
89     "type": "read_group",
90     "target_capture_kit_catalog_number": null,
91     "instrument_model": "Illumina HiSeq 2000",
92     "base_caller_name": null,
93     "experiment_name": "Resequencing",
94     "flow_cell_barcode": "205DDABXX",
95     "sequencing_center": "BI",
96     "base_caller_version": null
97   }
98 ],
99 "aliquot": [
100   {
101     "source_center": "23",
102     "centers": [],
103     "analytes": [],
104     "submitter_id": "Blood-00001-aliquot26",

```

```

105     "amount": 10,
106     "samples": [
107         {
108             "id": "23308708-6a63-471e-947c-6a93c6e85983",
109             "submitter_id": "Blood-00001_api26"
110         }
111     ],
112     "concentration": 0.07,
113     "project_id": "TCGA-ALCH",
114     "type": "aliquot",
115     "id": "e66dee54-5f4c-4471-9e08-dba0f6cdaaa4"
116 }
117 ],
118 "submitted_unaligned_reads": [
119     {
120         "read_groups": [
121             {
122                 "id": "90163202-cfd7-4f6a-8214-e7e4e924d3a6",
123                 "submitter_id": "Blood-00001-aliquot_lane1_barcode26"
124             }
125         ],
126         "data_type": "Unaligned Reads",
127         "file_name": "dummy.fastq",
128         "md5sum": "70c48a8a670ed2a02327601a10038d06",
129         "data_format": "FASTQ",
130         "submitter_id": "Blood-00001-aliquot_lane1_barcode26.fastq",
131         "state_comment": null,
132         "data_category": "Sequencing Data",
133         "file_size": 38,
134         "project_id": "TCGA-ALCH",
135         "type": "submitted_unaligned_reads",
136         "id": "6d45f2a0-8161-42e3-97e6-e058ac18f3f3",
137         "experimental_strategy": "WGS"
138     },
139     {
140         "read_groups": [
141             {
142                 "id": "90163202-cfd7-4f6a-8214-e7e4e924d3a6",
143                 "submitter_id": "Blood-00001-aliquot_lane1_barcode26"
144             }
145         ],
146         "data_type": "Unaligned Reads",
147         "file_name": "dummy.fastq",
148         "md5sum": "70c48a8a670ed2a02327601a10038d06",
149         "data_format": "FASTQ",
150         "submitter_id": "Blood-00001-aliquot_lane1_barcode27.fastq",
151         "state_comment": null,
152         "data_category": "Sequencing Data",
153         "file_size": 38,
154         "project_id": "TCGA-ALCH",
155         "type": "submitted_unaligned_reads",
156         "id": "4faabdd6-45bb-4259-8868-13d5b1149748",
157         "experimental_strategy": "WGS"
158     }
159 ]
160 }

```

GraphQL

Submitters can use the GraphQL query language for advanced search and retrieval of data from the GDC Submission Portal. See [GraphQL](#) for more information.

Deleting Entities

The **entities** endpoint can also be used to delete entities. This is accomplished using a DELETE request to the endpoint, specifying the entity's UUID. If an entity cannot be deleted because it is linked to child entities, the GDC Submission API will respond with an error providing a list of entities that must be deleted prior to deleting the subject entity.

A subgraph (a parent along with all of its child entities) can be deleted in a single transaction by passing a comma-separated list of UUIDs to the **entities** endpoint.

Entities in submitted state (assigned when the project has been submitted) cannot be deleted.

```
1 token=$(<gdc-token-text-file.txt)
2
3 curl --header "X-Auth-Token: $token" --request DELETE
   https://api.gdc.cancer.gov/v0/submission/TCGA/ALCH/entities/67782964-0065-491d-b051-2ae404bb734d
```

```
1 {
2   "code": 200,
3   "deleted_entity_count": 1,
4   "dependent_ids": "",
5   "entities": [
6     {
7       "action": "delete",
8       "errors": [],
9       "id": "67782964-0065-491d-b051-2ae404bb734d",
10      "related_cases": [],
11      "type": "case",
12      "valid": true,
13      "warnings": []
14    }
15  ],
16  "entity_error_count": 0,
17  "message": "Successfully deleted 1 entities",
18  "success": true,
19  "transaction_id": 192,
20  "transactional_error_count": 0,
21  "transactional_errors": []
22 }
```

Working With Files

Uploading Data Files

Experimental data files like BAM and FASTQ can be uploaded directly to the API using the **files** endpoint, by specifying the UUID of the corresponding **data_file** entity. Binary upload mode must be used if available. Uploading large files may be more efficiently performed using the GDC Data Transfer Tool.

```
1 token=$(<gdc-token-text-file.txt)
2
```

```
3 curl --header "X-Auth-Token: $token" --output needed_to_show_progress_bar.log --request PUT --data-binary
   @GDC-INTERNAL-000084-S1-Q1-RG1.fastq.zip
   https://api.gdc.cancer.gov/v0/submission/GDC/INTERNAL/files/c414a205-376e-4993-af48-2a4689eb433e &&
   rm needed_to_show_progress_bar.log
4
5     "&& rm needed_to_show_progress_bar.log" at the end of the command above
6     removes the temporary file required to show upload progress bar. This
7     will not work on Windows platforms. Windows users must remove this
8     string and can delete the file manually.
```

Upload Manifest

The **manifest** endpoint generates a manifest for uploading files using the GDC Data Transfer Tool. It requires a comma-separated list of file UUIDs to generate a manifest.

```
1 https://api.gdc.cancer.gov/v0/submission/PROGRAM/PROJECT/manifest?ids=bf0751ca-fc3b-4760-b876-0fefce040be5,90163
```

Downloading Files

Files in file state = validated can be downloaded by the submitter using the API or the Data Transfer Tool. This is done in a similar manner as files available in the Data Portal, but will require submission access to the particular project in dbGaP as opposed to downloader access. File UUIDs can be found in the original upload manifest file, the submission portal, or by API calls. See Downloading Files for details.

Deleting Files

Uploaded files can be deleted by deleting the entity that corresponds to the file. See [Deleting Entities](#) for details.

Querying Submitted Data Using GraphQL

GraphQL Overview

[GraphQL](#) is a query language that makes it easy to search and retrieve data from graph data structures such as the GDC Data Model.

Unlike the methods outlined in Search and Retrieval, which provide access to public releases (or snapshots) of GDC data, the `/graphql` endpoint of GDC Submission API makes it possible for submitters to access “live” data, which provides a real-time view of the state of entities in a project.

NOTE: Access to GDC Submission API GraphQL service is limited to authorized and authenticated submitters. Submitters may only access data in their own project using GraphQL.

GraphQL IDE

The GDC GraphQL IDE is an instance of [GraphiQL](#), an in-browser GraphQL IDE that facilitates construction and execution of GraphQL queries. The GDC GraphQL IDE provides tab-completion and syntax checking using schema from the GDC Data Dictionary. It can be found at <https://gdc-portal.nci.nih.gov/submission/graphiql>.

Before interacting directly with the GDC Submission API's GraphQL endpoint, users are encouraged to become familiar with executing queries using the GDC GraphQL IDE.

GraphQL Endpoint

GDC data submitters can access the GDC Submission API GraphQL endpoint at:

```
1 https://api.gdc.cancer.gov/[API_version/]submission/graphql
```

where **API_version/** is the optional API version component (see [Getting Started]).

NOTE: An authentication token is required for all requests to the **graphql** endpoint. Queries are restricted to those projects for which the submitter has obtained authorization.

Constructing a Query

When sending GraphQL requests to the API directly, the bare GraphQL query must be wrapped in a “query” JSON object as shown below:

When using the GDC GraphQL IDE, the bare JSON query must be used without a JSON wrapper.

Bare GraphQL query

In its simplest form, a GraphQL query is a **selection set** (curly brackets) that encloses a set of **fields**. The selection set defines the set of information that is to be retrieved. Furthermore, in GraphQL fields are conceptually equivalent to functions that retrieve additional fields and, in some cases, can take arguments. So each field in a selection set can have its own selection set, thereby creating a nested query structure that can navigate complex data relationships. See [GraphQL Specification](#) for further details.

In GDC GraphQL IDE, a root field (field within the outermost/umbrella selection set) typically corresponds to an entity, whereas fields inside nested selection sets are typically a combination of entities and entity properties.

The “Docs” panel on the right-hand side of the GDC GraphQL IDE allows users to discover the fields that can be queried with GraphQL. Note that the panel contains a lot of information and users may experience a delay before it is displayed.

A simple GraphQL query looks like this:

```
1 {
2   case (project_id: "TCGA-ALCH", first: 0) {
3     id
4     submitter_id
5   }
6   _case_count (project_id: "TCGA-ALCH")
7 }
8 }
```

The query above has two root fields: **case** and **_case_count**. The **case** field corresponds to the **case** entity in the GDC Data Model. The query supplies two arguments to the field:

1. **project_id**: "TCGA-ALCH", which requests only cases in the TCGA-ALCH project.
2. **first**: 0, which requests that the API provide all results in the response, without pagination (a nonzero positive integer value of **first** specifies the number of results to return, 10 by default; “pages” are selected using **offset**).

The **_case_count** field is a special field that returns the number of cases that match the supplied argument.

The bare query above can be used as is in the GraphQL IDE. In order to pass this query to the GDC API directly, it needs to be further processed as described below.

Passing GraphQL queries to GDC API directly

Before a bare GraphQL query is passed to the GDC API, it must be processed as follows:

1. [Escape](#) the query using JSON string rules
2. Wrap the query in a “**query**” **JSON object**.
3. Pass the query to the `graphql` endpoint in an HTTP POST request.

Using the `case` and `_case_count` example above as the starting point, the results are as follows:

```
1 {
2   case (project_id: "TCGA-ALCH", first: 0) {
3     id
4     submitter_id
5   }
6   _case_count (project_id: "TCGA-ALCH")
7 }
8 }
```

```
1 {\n\tcase (project_id: \"TCGA-ALCH\", first: 0) {\n\t\tid\n\t\tsubmitter_id\n\t\t}\n\t_case_count
   (project_id: \"TCGA-ALCH\")\n}
```

```
1 {
2   "query": "{\n\tcase (project_id: \"TCGA-ALCH\", first: 0)
   {\n\t\tid\n\t\tsubmitter_id\n\t\t}\n\t_case_count (project_id: \"TCGA-ALCH\")\n}",
3   "variables": null
4 }
```

```
1 token=$(<gdc-token-text-file.txt)
2
3 curl --request POST --header "X-Auth-Token: $token" 'https://api.gdc.cancer.gov/v0/submission/graphql'
   --data-binary @Query_json
```

```
1 {
2   "data": {
3     "_case_count": 20,
4     "case": [
5       {
6         "id": "700d1110-b6b4-4251-89d4-fa6f0698e3f8",
7         "submitter_id": "TCGA-ALCH-000004"
8       },
9       {
10        "id": "be01357d-7348-40b4-a997-8a61ae7af17d",
11        "submitter_id": "TCGA-ALCH-000005"
12      },
13      {
14        "id": "e5638697-6ef3-4bf8-a373-102519093f33",
15        "submitter_id": "TCGA-ALCH-000008"
16      },
17      {
18        "id": "4871d41a-680e-4fd0-901c-b06f06ecae33",
19        "submitter_id": "TCGA-ALCH-000007"
20      },
21      {
22        "id": "2f18c2c1-bff2-43b6-9702-e138c72d8c6b",
23        "submitter_id": "TCGA-ALCH-000009"
24      },
25      {
```

```

26     "id": "ec83e038-4f01-47a6-bc69-47fb297d0282",
27     "submitter_id": "TCGA-ALCH-000006"
28 },
29 {
30     "id": "e4642952-d259-4be1-9c53-ed95aa1fc50b",
31     "submitter_id": "TCGA-ALCH-000011"
32 },
33 {
34     "id": "8bcaf0b3-21d0-45c6-87ee-c997efb417dc",
35     "submitter_id": "TCGA-ALCH-000010"
36 },
37 {
38     "id": "83de027e-bcbf-4239-975b-7e8ced82448e",
39     "submitter_id": "TCGA-ALCH-000013"
40 },
41 {
42     "id": "bbd91cc1-06e2-4e60-8b93-e09c3b16f00c",
43     "submitter_id": "TCGA-ALCH-000014"
44 },
45 {
46     "id": "574fd163-4368-440c-9548-d76a0fbc9056",
47     "submitter_id": "TCGA-ALCH-000015"
48 },
49 {
50     "id": "47c92cdd-ff11-4c25-b0f0-0f7671144271",
51     "submitter_id": "TCGA-ALCH-000016"
52 },
53 {
54     "id": "9f13caab-1fda-4b2a-b500-f79dc978c6c1",
55     "submitter_id": "TCGA-ALCH-000017"
56 },
57 {
58     "id": "9418f194-8741-44db-bd8f-36f4fd8c3bf2",
59     "submitter_id": "TCGA-ALCH-000018"
60 },
61 {
62     "id": "6fb2a018-c5f3-45e5-81d3-e58e7e4bf921",
63     "submitter_id": "TCGA-ALCH-000019"
64 },
65 {
66     "id": "70236972-e796-414a-9b7a-3b29b849ba7c",
67     "submitter_id": "TCGA-ALCH-000020"
68 },
69 {
70     "id": "6f78e86f-9e31-4af5-a0d9-b8970ece476d",
71     "submitter_id": "TCGA-ALCH-000021"
72 },
73 {
74     "id": "c6fcb2f0-c6bb-4b40-a761-bae3e63869cb",
75     "submitter_id": "TCGA-ALCH-000002"
76 },
77 {
78     "id": "67782964-0065-491d-b051-2ae404bb734d",
79     "submitter_id": "TCGA-ALCH-000001"
80 },
81 {
82     "id": "b45d2891-ba81-4ecc-a250-c58060934227",
83     "submitter_id": "TCGA-ALCH-000012"

```

```

84     }
85   ]
86 }
87 }

```

Additional Examples

Example: File UUID

GraphQL query to find the file UUID based on file `submitter_id`:

```

1 {
2
3   submitted_unaligned_reads (project_id: "GDC-INTERNAL", submitter_id:
4     "Blood-00001-aliquot_lane1_barcode23.fastq") {
5     id
6     submitter_id
7     file_name
8     project_id
9   }

```

```

1 {
2   "query": "{\n \n submitted_unaligned_reads (project_id: \"GDC-INTERNAL\", submitter_id:
3     \"Blood-00001-aliquot_lane1_barcode23.fastq\") {\n id\n submitter_id\n file_name\n
4     project_id\n}\n}",
5   "variables": null
6 }

```

```

1 curl --request POST --header "X-Auth-Token: $token" 'https://api.gdc.cancer.gov/v0/submission/graphql'
2 --data-binary @escaped_GraphQL

```

```

1 {
2   "data": {
3     "submitted_unaligned_reads": [
4       {
5         "file_name": "dummy.fastq",
6         "id": "616eab2f-791a-4641-8cd6-ee195a10a201",
7         "project_id": "GDC-INTERNAL",
8         "submitter_id": "Blood-00001-aliquot_lane1_barcode23.fastq"
9       }
10    ]
11  }
12 }

```

Example: Case Without Diagnosis

GraphQL query for any one case in 'TCGA-LUAD' without Diagnosis information:

```

1 {
2   case (project_id: "TCGA-LUAD", without_links: ["diagnoses"], first: 1) {
3     submitter_id
4   }
5 }

```



```

1 {
2   "data": {
3     "case": [
4       {
5         "submitter_id": "TCGA-17-Z050"
6       }
7     ]
8   }
9 }

```

Example: Number of Cases Without Diagnosis

GraphQL query for the number of cases in 'TCGA-LUAD' without Diagnosis information:

```

1 {
2   _case_count (project_id: "TCGA-LUAD", without_links: ["diagnoses"])
3 }

```

```

1 {
2   "data": {
3     "_case_count": 5
4   }
5 }

```

Example: Aliquot State

Query for the state of aliquots belonging to case with submitter_id: "TCGA-ALCH-000001":

```

1 {
2   aliquot(with_path_to: {type: "case", submitter_id:"TCGA-ALCH-000001"}) {
3     id release_state
4   }
5 }

```

```

1 {
2   "data": {
3     "aliquot": [
4       {
5         "id": "7af58da0-cb3e-43e2-a074-4bd8f27565ba",
6         "state": "validated"
7       }
8     ]
9   }
10 }

```

Example: Aliases

GraphQL query that uses a GraphQL fragment to get specific properties from two portions and give them aliases in the response:

```

1 {
2   some_portion: portion (first: 1) {
3     ...portionProperties
4   }
5   specific_portion: portion(submitter_id: "TCGA-67-6217-01A-13-2191-20") {
6     ...portionProperties
7   }

```

```

8 }
9
10 fragment portionProperties on portion {
11   submitter_id
12   is_ffpe
13 }

```

```

1 {
2   "data": {
3     "some_portion": [
4       {
5         "is_ffpe": false,
6         "submitter_id": "TCGA-62-A471-10A-01"
7       }
8     ],
9     "specific_portion": [
10      {
11        "is_ffpe": false,
12        "submitter_id": "TCGA-67-6217-01A-13-2191-20"
13      }
14    ]
15  }
16 }

```

Example: Biospecimen Tree

GraphQL Query for a case in “TCGA-LUAD” and return a biospecimen tree:

```

1 {
2   case(project_id: "TCGA-LUAD", first: 1) {
3     id
4     samples(first: 1) {
5       id
6       portions(first: 1) {
7         id
8         analytes(first: 1) {
9           id
10          aliquots(first: 1) {
11            id
12          }
13        }
14      }
15    }
16  }
17 }

```

```

1 {
2   "data": {
3     "case": [
4       {
5         "id": "19ca36e6-2154-4224-89b1-117a4a4407f6",
6         "samples": [
7           {
8             "id": "5e2625d2-290d-48cd-af5c-27dc8e3c8b6a",
9             "portions": [
10              {
11                "analytes": [

```

```
12         {
13             "aliquots": [
14                 {
15                     "id": "8e1820d5-dcd8-4760-9962-221e2b71d4b9"
16                 }
17             ],
18             "id": "6449533c-e52a-4e58-bae7-0732f48153ef"
19         }
20     ],
21     "id": "26b75643-8fcd-445e-a0e0-9868cac589ea"
22 }
23 ]
24 }
25 ]
26 }
27 ]
28 }
29 }
```

Chapter 7

System Information

System Information

Overview

The GDC API offers endpoints that provide information about the system. These endpoints are described below.

GDC Notifications Endpoint

The `notifications` endpoint provides current user-facing notifications.

GDC notifications have a corresponding `level` with the following meanings:

Level	Meaning
INFO	Non-essential information, e.g. regarding a new dataset
WARNING	Important user information, e.g. regarding a dataset to be removed
ERROR	Important system information, e.g. regarding a GDC component
DEBUG	Unimportant system information, e.g. testing the notification system

Notifications will indicate the GDC `components` to which they apply:

Component	Description
PORTAL	The GDC Data Portal
LEGACY	The GDC Legacy Archive
SUBMISSION	The GDC Data Submission Portal
DOCUMENTATION	The GDC documentation site that contains GDC user guides, release notes, and the GDC Data Dictionary
WEBSITE	The GDC project website that includes information about the system. This does not include any of the above-listed GDC components.

Sample Request

```
1 curl --request GET https://api.gdc.cancer.gov/v0/notifications
```

```
1 {
2   "data": [
3     {
4       "level": "INFO",
5       "components": [
6         "SUBMISSION_API",
7         "LEGACY_API"
8       ],
9       "message": "The system is up!"
10    }
11  ]
12 }
```

API Status Endpoint

The **status** endpoint provides information about the current status and version of the GDC API.

Sample Request

```
1 curl https://api.gdc.cancer.gov/status
```

```
1 import requests
2 import json
3
4 status_endpt = 'https://api.gdc.cancer.gov/status'
5 response = requests.get(status_endpt)
6 print json.dumps(response.json(), indent=2)

1 {
2   "commit": "74e1e3583c0f39fbf2149322addb7378206be3b9",
3   "status": "OK",
4   "tag": "1.2.0",
5   "version": 1
6 }
```

Chapter 8

Additional Examples

Additional Examples

Data Search and Retrieval

Endpoint Examples

This section contains additional examples for using endpoints.

Project Endpoint Example

This example is a query for Projects contained in GDC. It returns only the first five projects sorted by project name.

```
1 curl 'https://api.gdc.cancer.gov/projects?from=0&size=5&sort=project.name:asc&pretty=true'
```

```
1 {
2   "data": {
3     "hits": [
4       {
5         "state": "legacy",
6         "project_id": "TARGET-AML",
7         "primary_site": "Blood",
8         "disease_type": "Acute Myeloid Leukemia",
9         "name": "Acute Myeloid Leukemia"
10      },
11      {
12        "state": "legacy",
13        "project_id": "TCGA-LAML",
14        "primary_site": "Blood",
15        "disease_type": "Acute Myeloid Leukemia",
16        "name": "Acute Myeloid Leukemia"
17      },
18      {
19        "state": "legacy",
20        "project_id": "TARGET-AML-IF",
21        "primary_site": "Blood",
22        "disease_type": "Acute Myeloid Leukemia Induction Failure",
23        "name": "Acute Myeloid Leukemia Induction Failure"
24      },
25      {
26        "state": "legacy",
```

```

27     "project_id": "TARGET-ALL-P2",
28     "primary_site": "Blood",
29     "disease_type": "Acute Lymphoblastic Leukemia",
30     "name": "Acute Lymphoblastic Leukemia - Phase II"
31 },
32 {
33     "state": "legacy",
34     "project_id": "TARGET-ALL-P1",
35     "primary_site": "Blood",
36     "disease_type": "Acute Lymphoblastic Leukemia",
37     "name": "Acute Lymphoblastic Leukemia - Phase I"
38 }
39 ],
40 "pagination": {
41     "count": 5,
42     "sort": "project.name:asc",
43     "from": 0,
44     "pages": 10,
45     "total": 46,
46     "page": 1,
47     "size": 5
48 }
49 },
50 "warnings": {}
51 }

```

Files Endpoint Example

This example is a query for files contained in GDC. It returns only the first two files, sorted by file size, from smallest to largest.

```
1 curl 'https://api.gdc.cancer.gov/files?from=0&size=2&sort=file_size:asc&pretty=true'
```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "data_type": "Raw Simple Somatic Mutation",
6         "updated_datetime": "2017-03-04T16:45:40.925270-06:00",
7         "file_name": "9f78a291-2d50-472c-8f56-5f8fbd09ab2a.snp.Somatic.hc.vcf.gz",
8         "submitter_id": "TCGA-13-0757-01A-01W-0371-08_TCGA-13-0757-10A-01W-0371-08_varscan",
9         "file_id": "9f78a291-2d50-472c-8f56-5f8fbd09ab2a",
10        "file_size": 1120,
11        "id": "9f78a291-2d50-472c-8f56-5f8fbd09ab2a",
12        "created_datetime": "2016-05-04T14:50:54.560567-05:00",
13        "md5sum": "13c1ceb3519615e2c67128b350365fbf",
14        "data_format": "VCF",
15        "acl": [
16          "phs000178"
17        ],
18        "access": "controlled",
19        "state": "live",
20        "data_category": "Simple Nucleotide Variation",
21        "type": "simple_somatic_mutation",
22        "file_state": "submitted",
23        "experimental_strategy": "WXS"
24      },
25      {

```

```

26     "data_type": "Raw Simple Somatic Mutation",
27     "updated_datetime": "2017-03-04T16:45:40.925270-06:00",
28     "file_name": "7780009b-abb6-460b-903d-accdac626c2e.snp.Somatic.hc.vcf.gz",
29     "submitter_id": "TCGA-HC-8261-01A-11D-2260-08_TCGA-HC-8261-10A-01D-2260-08_varscan",
30     "file_id": "7780009b-abb6-460b-903d-accdac626c2e",
31     "file_size": 1237,
32     "id": "7780009b-abb6-460b-903d-accdac626c2e",
33     "created_datetime": "2016-05-08T13:54:38.369393-05:00",
34     "md5sum": "fd9bb46c8022b96af730c48dc00e2c41",
35     "data_format": "VCF",
36     "acl": [
37         "phs000178"
38     ],
39     "access": "controlled",
40     "state": "live",
41     "data_category": "Simple Nucleotide Variation",
42     "type": "simple_somatic_mutation",
43     "file_state": "submitted",
44     "experimental_strategy": "WXS"
45 }
46 ],
47 "pagination": {
48     "count": 2,
49     "sort": "file_size:asc",
50     "from": 0,
51     "page": 1,
52     "total": 274724,
53     "pages": 137362,
54     "size": 2
55 }
56 },
57 "warnings": {}
58 }

```

Cases Endpoint Example

This example is a query for cases contained in GDC. It returns only the first five files.

```
1 curl 'https://api.gdc.cancer.gov/cases?from=0&size=5&pretty=true'
```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "updated_datetime": "2017-03-09T10:01:14.834935-06:00",
6         "submitter_analyte_ids": [
7           "TCGA-ER-A193-06A-12D",
8           "TCGA-ER-A193-06A-12R",
9           "TCGA-ER-A193-06A-12W",
10          "TCGA-ER-A193-10A-01W",
11          "TCGA-ER-A193-10A-01D"
12        ],
13        "analyte_ids": [
14          "62e14ca4-95f5-4af3-848f-83f7273c3b70",
15          "6178b8aa-6afb-4951-bc92-bf9bfc57b9c7",
16          "e16b701c-7809-4fb5-a9e0-4ff71e5d1d84",
17          "5bfa8c9f-6797-4b2b-9122-854f8ab3bbba",

```



```

    "9b73d64e-c973-45b6-be31-a486fb8d1708"
  ],
  "submitter_id": "TCGA-ER-A193",
  "case_id": "8ab09143-daf6-40a9-85d3-0fe9de7b3e06",
  "id": "8ab09143-daf6-40a9-85d3-0fe9de7b3e06",
  "disease_type": "Skin Cutaneous Melanoma",
  "sample_ids": [
    "378b3d8a-adbb-4912-a0bf-6b74a282113e",
    "7a384d44-8b05-4197-9921-7d020ada2437"
  ],
  "portion_ids": [
    "6680bbf2-9cf1-4f93-9ec3-04318cffb5ba",
    "690d3b12-a61d-42fd-af2a-5a7a9a3e5de8",
    "824d724e-6836-423e-a751-fee3260ef4d2"
  ],
  "submitter_portion_ids": [
    "TCGA-ER-A193-06A-21-A20N-20",
    "TCGA-ER-A193-10A-01",
    "TCGA-ER-A193-06A-12"
  ],
  "created_datetime": null,
  "slide_ids": [
    "d2751354-a8b7-4f7a-a4f1-d062de5ceb14"
  ],
  "state": "live",
  "aliquot_ids": [
    "dc9f9544-6c76-4b45-b5c3-dd2fec5acfe",
    "390b3574-ba23-4ecb-acf8-f5ad8a958bd2",
    "33f43961-b32d-46fc-ba11-264f1101e78d",
    "cd17367c-3270-42ae-8ac5-941a3453ea33",
    "b17269a2-79aa-459e-9c3d-589b7efe6fd9",
    "28a7d729-7555-4545-924b-3dec49b54230",
    "13256e77-0b0b-49e3-9959-3b6730d68732",
    "87ca642a-dd4c-47ea-b81f-2d3402f2157a",
    "8a1bfe0e-c97a-41c4-815f-cf5bb5cfc69f",
    "5e1e9c82-99fd-49de-9dfb-a349d4d8ac94",
    "67f00459-e423-4900-be23-9283b0478620",
    "d939c477-a01f-4d54-bcfb-c9fdd957f2ec"
  ],
  "primary_site": "Skin",
  "submitter_aliquot_ids": [
    "TCGA-ER-A193-06A-12D-A18Y-02",
    "TCGA-ER-A193-10A-01D-A193-01",
    "TCGA-ER-A193-10A-01D-A190-02",
    "TCGA-ER-A193-06A-12D-A197-08",
    "TCGA-ER-A193-06A-12R-A18S-07",
    "TCGA-ER-A193-06A-12W-A20H-08",
    "TCGA-ER-A193-10A-01D-A199-08",
    "TCGA-ER-A193-10A-01D-A38R-08",
    "TCGA-ER-A193-10A-01W-A20J-08",
    "TCGA-ER-A193-06A-12R-A18V-13",
    "TCGA-ER-A193-06A-12D-A19C-05",
    "TCGA-ER-A193-06A-12D-A191-01"
  ],
  "submitter_sample_ids": [
    "TCGA-ER-A193-10A",
    "TCGA-ER-A193-06A"
  ],

```

```

76     "submitter_slide_ids": [
77         "TCGA-ER-A193-06A-01-TSA"
78     ]
79 },
80 {
81     "updated_datetime": "2017-03-04T16:39:19.244769-06:00",
82     "submitter_analyte_ids": [
83         "TCGA-VR-AA4G-10A-01W",
84         "TCGA-VR-AA4G-01A-11R",
85         "TCGA-VR-AA4G-10A-01D",
86         "TCGA-VR-AA4G-01A-11D",
87         "TCGA-VR-AA4G-01A-11W"
88     ],
89     "analyte_ids": [
90         "152d7d7a-c746-4b58-8c3f-4252454c7b7c",
91         "9090d556-bd2e-4851-8a0c-46e22cc61408",
92         "7118f4c3-b635-4428-8240-8db85281f2d9",
93         "1d8223ff-685a-4427-a3d1-f53887f2a19d",
94         "60dfb30a-bea0-426d-b11d-d5813ba39cfc"
95     ],
96     "submitter_id": "TCGA-VR-AA4G",
97     "case_id": "df5bd25c-d70b-4126-89cb-6c838044ae3b",
98     "id": "df5bd25c-d70b-4126-89cb-6c838044ae3b",
99     "disease_type": "Esophageal Carcinoma",
100    "sample_ids": [
101        "21456849-38a9-4190-9ece-ed69b3c24fda",
102        "6ee6d239-2af6-41cd-bc32-c5cdaf7742b0"
103    ],
104    "portion_ids": [
105        "484b40d5-d77c-4e6f-9e80-1ef27ffbc8a5",
106        "fdc56e67-52ab-44fd-823a-5a3124876ff7"
107    ],
108    "submitter_portion_ids": [
109        "TCGA-VR-AA4G-10A-01",
110        "TCGA-VR-AA4G-01A-11"
111    ],
112    "created_datetime": null,
113    "slide_ids": [
114        "e950eba2-7d6e-4ffd-a2d5-e0eb6486848a"
115    ],
116    "state": "live",
117    "aliquot_ids": [
118        "db6beed3-a5a2-469f-8dc8-00d838c1f37f",
119        "f5db4d36-034b-429b-a7be-26a872b702ee",
120        "16421a96-b843-4f7e-9f7c-64d2fb5b2a25",
121        "5d938cb5-7064-40bc-877d-57faa94c3333",
122        "d231404d-ece5-43c0-a8a3-e9f294ceb777",
123        "8c77dc3e-2ea3-4626-88f5-e74f242bedf3",
124        "993624d4-1c28-41a5-a0b6-094a0e442c36",
125        "105a18c9-df7e-4573-b1a2-6a987e57d553",
126        "af81c3bb-3b9e-41cb-b85a-b55c6437d05b",
127        "38938066-5fd9-415c-b00e-65efff14085e",
128        "20139afe-ad04-4571-b779-0c4a51e74ada"
129    ],
130    "primary_site": "Esophagus",
131    "submitter_aliquot_ids": [
132        "TCGA-VR-AA4G-10A-01W-A44M-09",
133        "TCGA-VR-AA4G-01A-11D-A37B-01",

```

```

134     "TCGA-VR-AA4G-01A-11D-A37D-05",
135     "TCGA-VR-AA4G-10A-01D-A37F-09",
136     "TCGA-VR-AA4G-01A-11D-A37R-26",
137     "TCGA-VR-AA4G-01A-11R-A37J-13",
138     "TCGA-VR-AA4G-01A-11R-A37I-31",
139     "TCGA-VR-AA4G-01A-11D-A37C-09",
140     "TCGA-VR-AA4G-10A-01D-A37R-26",
141     "TCGA-VR-AA4G-10A-01D-A37E-01",
142     "TCGA-VR-AA4G-01A-11W-A44L-09"
143 ],
144 "submitter_sample_ids": [
145     "TCGA-VR-AA4G-01A",
146     "TCGA-VR-AA4G-10A"
147 ],
148 "submitter_slide_ids": [
149     "TCGA-VR-AA4G-01A-01-TS1"
150 ]
151 },
152 {
153     "updated_datetime": "2017-03-04T16:39:19.244769-06:00",
154     "submitter_analyte_ids": [
155         "TCGA-D1-A174-01A-11D",
156         "TCGA-D1-A174-01A-11W",
157         "TCGA-D1-A174-10A-01D",
158         "TCGA-D1-A174-10A-01W",
159         "TCGA-D1-A174-01A-11R"
160 ],
161     "analyte_ids": [
162         "96203028-f824-4a90-9758-22340285062c",
163         "f4878e33-b773-43b5-83a5-9fd8e539e668",
164         "8627ccd0-0575-4d03-b589-ca45642d523d",
165         "1183f7c6-992d-4084-946e-adce7c52f9cc",
166         "5343f6a8-8ac2-4446-ace5-a27d21e76844"
167 ],
168     "submitter_id": "TCGA-D1-A174",
169     "case_id": "fc7315b0-9f48-4206-b197-2268c0518eb4",
170     "id": "fc7315b0-9f48-4206-b197-2268c0518eb4",
171     "disease_type": "Uterine Corpus Endometrial Carcinoma",
172     "sample_ids": [
173         "df9a1f44-9b3f-48b2-96af-54aaabdfd243",
174         "ad5a9cb6-b3f9-4651-b6d1-13c78010bd88"
175 ],
176     "portion_ids": [
177         "79dd516c-bae3-4f6e-b4cb-901de030acb7",
178         "6e55e6d9-902f-439b-b6f1-ca296c123fd3"
179 ],
180     "submitter_portion_ids": [
181         "TCGA-D1-A174-01A-11",
182         "TCGA-D1-A174-10A-01"
183 ],
184     "created_datetime": null,
185     "slide_ids": [
186         "7602727e-b46d-40fc-bd03-5ccf631041f8"
187 ],
188     "state": "live",
189     "aliquot_ids": [
190         "5c15542b-cd63-44b5-b278-e211410fb0aa",
191         "d661cfb9-248a-49e6-b0db-865ca257e8dc",

```

```

192     "83bd3bdb-9bd3-46fa-888c-f6f5efec530f",
193     "c46551c9-c0d0-4140-8d0a-946b53e504e2",
194     "96b511df-3a69-4168-908c-662060b4f976",
195     "0182d4e1-f835-46b5-a8f0-53decf5868de",
196     "e9563a06-0b86-4986-976e-43d4040f1d61",
197     "6bb2de6e-5b85-4e97-a930-1f2c6bf663a1",
198     "f6ee5558-a1b6-4b11-8f48-c17186fff39a",
199     "67f6f0d9-6581-4946-a9c7-a6629da86888",
200     "39e9a948-054a-4b50-b108-7d7aee686363",
201     "ddb4ca26-655d-4bdc-a00d-7caf26cadafe"
202 ],
203 "primary_site": "Uterus",
204 "submitter_aliquot_ids": [
205     "TCGA-D1-A174-01A-11D-A12F-02",
206     "TCGA-D1-A174-01A-01D-YYYY-23",
207     "TCGA-D1-A174-01A-11W-A139-09",
208     "TCGA-D1-A174-10A-01W-A139-09",
209     "TCGA-D1-A174-01A-11D-A12K-05",
210     "TCGA-D1-A174-10A-01D-A12F-02",
211     "TCGA-D1-A174-10A-01D-A12G-01",
212     "TCGA-D1-A174-01A-11R-A12I-07",
213     "TCGA-D1-A174-01A-11D-A12J-09",
214     "TCGA-D1-A174-10A-01D-A12J-09",
215     "TCGA-D1-A174-01A-11R-A12H-13",
216     "TCGA-D1-A174-01A-11D-A12G-01"
217 ],
218 "submitter_sample_ids": [
219     "TCGA-D1-A174-01A",
220     "TCGA-D1-A174-10A"
221 ],
222 "submitter_slide_ids": [
223     "TCGA-D1-A174-01A-01-TS1"
224 ]
225 },
226 {
227     "updated_datetime": "2017-03-04T16:39:19.244769-06:00",
228     "submitter_analyte_ids": [
229         "TCGA-XM-A8RL-10A-01D",
230         "TCGA-XM-A8RL-01A-11R",
231         "TCGA-XM-A8RL-01A-11D"
232     ],
233     "analyte_ids": [
234         "2c483e72-92b0-425d-ac1b-b75a169cf531",
235         "57f88d4f-8b3a-4349-88b0-3d2e58a95ed9",
236         "499bfbe1-639c-479c-abaa-42cbb11c0568"
237     ],
238     "submitter_id": "TCGA-XM-A8RL",
239     "case_id": "dd240b82-b1d6-4c0f-aa3e-6fcfe1364ec1",
240     "id": "dd240b82-b1d6-4c0f-aa3e-6fcfe1364ec1",
241     "disease_type": "Thymoma",
242     "sample_ids": [
243         "cb091cc1-7bbe-43a4-8460-01215af3aa21",
244         "cabc9729-c1e1-4f08-9959-985dcb7a00d5"
245     ],
246     "portion_ids": [
247         "e8ea57c9-729e-46ea-b1da-2db7a00b02bc",
248         "8e2edb92-753f-4cb0-a5b8-8c45dbefaf36",
249         "650fa4f2-9fa2-4d3a-8b63-ff4a9bd8c33e"

```

```

250 ],
251 "submitter_portion_ids": [
252     "TCGA-XM-A8RL-01A-21-A45R-20",
253     "TCGA-XM-A8RL-10A-01",
254     "TCGA-XM-A8RL-01A-11"
255 ],
256 "created_datetime": null,
257 "slide_ids": [
258     "08cedd34-aafd-4b47-891f-cf66ee1f627b"
259 ],
260 "state": "live",
261 "aliquot_ids": [
262     "df9d8553-8d5b-4c65-8b28-74030a8f8e76",
263     "47b7f634-b36f-49e9-a4dc-d8f5508fdc0a",
264     "e692ebed-9721-40db-8986-fcaba07d68f1",
265     "189ee080-95d1-4ccb-8618-955605c7bd55",
266     "83af7ff3-45be-4378-a8b5-5dff3584e95d",
267     "42ebb1f0-e236-48ae-847f-69a153969903",
268     "e8a4938f-6b93-4ad1-9324-31c97dd1d477"
269 ],
270 "primary_site": "Thymus",
271 "submitter_aliquot_ids": [
272     "TCGA-XM-A8RL-10A-01D-A426-09",
273     "TCGA-XM-A8RL-01A-11D-A423-09",
274     "TCGA-XM-A8RL-01A-11D-A422-01",
275     "TCGA-XM-A8RL-01A-11R-A42C-07",
276     "TCGA-XM-A8RL-10A-01D-A425-01",
277     "TCGA-XM-A8RL-01A-11R-A42W-13",
278     "TCGA-XM-A8RL-01A-11D-A424-05"
279 ],
280 "submitter_sample_ids": [
281     "TCGA-XM-A8RL-10A",
282     "TCGA-XM-A8RL-01A"
283 ],
284 "submitter_slide_ids": [
285     "TCGA-XM-A8RL-01A-01-TSA"
286 ]
287 },
288 {
289     "updated_datetime": "2017-03-04T16:39:19.244769-06:00",
290     "submitter_analyte_ids": [
291         "TCGA-B0-5120-01A-01W",
292         "TCGA-B0-5120-01A-01D",
293         "TCGA-B0-5120-01A-01R",
294         "TCGA-B0-5120-11A-01W",
295         "TCGA-B0-5120-11A-01D"
296 ],
297     "analyte_ids": [
298         "996336e6-fad7-4100-96ae-60adb5c276f1",
299         "0eb7da02-0b90-4f6d-abd2-b048a9cb2995",
300         "fa2861b9-67c1-486a-a1e0-95d8f8adf65b",
301         "7e9f5639-a462-493e-98f8-1b7aeee383c7",
302         "d51e9fd4-0c99-49ec-9de5-db3946b0bf43"
303 ],
304     "submitter_id": "TCGA-B0-5120",
305     "case_id": "c5bf474c-6919-47b4-ba59-34ab20c087d5",
306     "id": "c5bf474c-6919-47b4-ba59-34ab20c087d5",
307     "disease_type": "Kidney Renal Clear Cell Carcinoma",

```

```

308     "sample_ids": [
309         "b50d3c6f-fdec-488b-ab26-a9b690fad34f",
310         "f3148210-ecae-4314-b5f8-9bee2315a093"
311     ],
312     "portion_ids": [
313         "b8fcbf00-4c5a-42c3-95e9-fb6e169a8da9",
314         "34443e91-0210-4477-9511-53026ae62b38",
315         "e466f011-79a1-4158-b796-f8e9dda32d68"
316     ],
317     "submitter_portion_ids": [
318         "TCGA-BO-5120-01A-01",
319         "TCGA-BO-5120-11A-01",
320         "TCGA-BO-5120-01A-21-1740-20"
321     ],
322     "created_datetime": null,
323     "slide_ids": [
324         "e5a29e92-4125-4acb-a797-86822b4961a2",
325         "78d873e0-037f-4aef-8725-7c651598b1f8",
326         "43d8cec7-f5a0-45d5-a5f8-cc77d6b7b539"
327     ],
328     "state": "live",
329     "aliquot_ids": [
330         "b35280fe-dbfa-4e45-8f49-3d0489e68743",
331         "a2e3a2f2-c32b-44a1-9b29-911145d700b8",
332         "a064d108-e8b2-46fa-b277-0a7a89904a3a",
333         "59be71a1-50e3-4565-852a-173afc8a6851",
334         "136dff0e-b181-49c9-8305-b3289625ea2e",
335         "8fbb983b-53ad-44a9-976a-7945628eaa51",
336         "cecf40f8-7301-4db9-b276-a14317d4dd59",
337         "fac8b066-bf2c-4f08-b42b-251035596a28",
338         "fa55c92f-54e8-436b-b8c4-04cb68a24e93",
339         "007e3098-aaf9-4ee7-9ae1-f94b131a5ae0",
340         "6ce58fbc-6742-4ade-84b0-cd025266e030",
341         "9668e15e-a3fa-4ead-ad42-322c5700e0db",
342         "c1167003-0730-41d5-bdd5-1cbf501c1463",
343         "73aab074-cbd1-45f2-8266-9ef6f7c559bc"
344     ],
345     "primary_site": "Kidney",
346     "submitter_aliquot_ids": [
347         "TCGA-BO-5120-11A-01D-1416-02",
348         "TCGA-BO-5120-11A-01D-2099-10",
349         "TCGA-BO-5120-11A-01D-1418-05",
350         "TCGA-BO-5120-01A-01W-1475-10",
351         "TCGA-BO-5120-01A-01D-1421-08",
352         "TCGA-BO-5120-01A-01D-1416-02",
353         "TCGA-BO-5120-01A-01R-1419-13",
354         "TCGA-BO-5120-01A-01R-1420-07",
355         "TCGA-BO-5120-11A-01D-1421-08",
356         "TCGA-BO-5120-01A-01D-1417-01",
357         "TCGA-BO-5120-01A-01D-1418-05",
358         "TCGA-BO-5120-11A-01W-1475-10",
359         "TCGA-BO-5120-01A-01D-2099-10",
360         "TCGA-BO-5120-11A-01D-1417-01"
361     ],
362     "submitter_sample_ids": [
363         "TCGA-BO-5120-11A",
364         "TCGA-BO-5120-01A"
365     ],

```

```

366     "submitter_slide_ids": [
367         "TCGA-BO-5120-11A-01-TS1",
368         "TCGA-BO-5120-01A-01-BS1",
369         "TCGA-BO-5120-01A-01-TS1"
370     ]
371 }
372 ],
373 "pagination": {
374     "count": 5,
375     "sort": "",
376     "from": 0,
377     "page": 1,
378     "total": 14551,
379     "pages": 2911,
380     "size": 5
381 }
382 },
383 "warnings": {}
384 }

```

Annotations Endpoint Example

This example is a query for annotations contained in the GDC. It returns only the first two annotations.

```
1 curl 'https://api.gdc.cancer.gov/annotations?from=0&size=2&pretty=true'
```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "category": "History of unacceptable prior treatment related to a prior/other malignancy",
6         "status": "Approved",
7         "entity_id": "51c37449-6a2e-4c3d-a7cc-06f901e1224f",
8         "classification": "Notification",
9         "entity_type": "case",
10        "created_datetime": "2014-06-16T00:00:00",
11        "annotation_id": "3d086829-de62-5d08-b848-ce0724188ff0",
12        "notes": "unknown treatment history",
13        "updated_datetime": "2017-03-09T12:32:36.305475-06:00",
14        "submitter_id": "20743",
15        "state": "submitted",
16        "case_id": "51c37449-6a2e-4c3d-a7cc-06f901e1224f",
17        "case_submitter_id": "TCGA-AG-A014",
18        "entity_submitter_id": "TCGA-AG-A014",
19        "id": "3d086829-de62-5d08-b848-ce0724188ff0"
20      },
21      {
22        "category": "Center QC failed",
23        "status": "Approved",
24        "entity_id": "733f0607-6c6b-4385-9868-fa6f155a9a2e",
25        "classification": "CenterNotification",
26        "entity_type": "aliquot",
27        "created_datetime": "2012-07-20T00:00:00",
28        "annotation_id": "5cf05f41-ce70-58a3-8ecb-6bfaf6264437",
29        "notes": "RNA-seq: INSUFFICIENT INPUT MATERIAL, LOW SEQUENCE YIELD/DIVERSITY; LOW 5/3 COVERAGE
30        "updated_datetime": "2017-03-09T13:51:45.396638-06:00",

```

```

31     "submitter_id": "8764",
32     "state": "submitted",
33     "case_id": "3e8a51bf-7e1f-4eab-af83-3c60d04db1bf",
34     "case_submitter_id": "TCGA-13-0913",
35     "entity_submitter_id": "TCGA-13-0913-02A-01R-1564-13",
36     "id": "5cf05f41-ce70-58a3-8ecb-6bfaf6264437"
37 }
38 ],
39 "pagination": {
40     "count": 2,
41     "sort": "",
42     "from": 0,
43     "page": 1,
44     "total": 2361,
45     "pages": 1181,
46     "size": 2
47 }
48 },
49 "warnings": {}
50 }

```

Filters Examples

This section contains additional examples for using the `filters` parameter.

Example: Basic syntax

The following is an example of `filters` syntax, including the JSON object passed to the `filters` parameter, the corresponding API query, and the JSON object returned by the API. The example finds projects where the primary site is Blood.

```

1 {
2   "op": "and",
3   "content": [
4     {
5       "op": "in",
6       "content": {
7         "field": "primary_site",
8         "value": [
9           "Blood"
10        ]
11      }
12    }
13  ]
14 }

```

```

1 curl
   'https://api.gdc.cancer.gov/projects?filters=%7b%0d%0a%22op%22%3a%22and%22%2c%0d%0a%22content%22%3a%5b%

```

```

1 {
2   "data": {
3     "hits": [
4       {
5         "dbgap_accession_number": "phs000465",
6         "disease_type": [
7           "Acute Myeloid Leukemia"
8         ],

```



```

9     "released": true,
10    "state": "legacy",
11    "primary_site": [
12      "Blood"
13    ],
14    "project_id": "TARGET-AML",
15    "id": "TARGET-AML",
16    "name": "Acute Myeloid Leukemia"
17  }
18 ],
19 "pagination": {
20   "count": 1,
21   "sort": "",
22   "from": 0,
23   "page": 1,
24   "total": 1,
25   "pages": 1,
26   "size": 10
27 }
28 },
29 "warnings": {}
30 }

```

Example: Filter cases keeping only ‘male’

This is an example of a value-based filter:

```

1 {
2   "op" : "=" ,
3   "content" : {
4     "field" : "cases.demographic.gender" ,
5     "value" : [ "male" ]
6   }
7 }

```

```

1 curl
   'https://api.gdc.cancer.gov/cases?filters=%7b%0d%0a+++%22op%22+%3a+%22%3d%22+%2c%0d%0a+++%22content%22+%3a+%

```

Example: Filter using a range

This is an example of filtering for age at diagnosis. The request is for cases where the age at diagnosis is between 40 and 70 years.

Note: age_at_diagnosis is expressed in days.

```

1 {
2   "op": "and",
3   "content": [
4     {
5       "op": ">=",
6       "content": {
7         "field": "cases.diagnoses.age_at_diagnosis",
8         "value": [
9           14600
10        ]
11      }
12    },
13    {
14      "op": "<=",

```

```

15         "content": {
16             "field": "cases.diagnoses.age_at_diagnosis",
17             "value": [
18                 25550
19             ]
20         }
21     }
22 ]
23 }

```

```

1 curl
  'https://api.gdc.cancer.gov/cases?filters=%7B%22op%22:%22and%22,%22content%22:%5B%7B%22op%22:%22%3E%3D%22,%2

```

Example: Multiple fields

Filter projects for primary_site being Kidney or Brain and program.name being TCGA

```

1 {
2     "op" : "and" ,
3     "content" : [{
4         "op" : "in" ,
5         "content" : {
6             "field" : "primary_site" ,
7             "value" : [
8                 "Kidney" ,
9                 "Brain"
10            ]
11        }
12    }, {
13        "op" : "in" ,
14        "content" : {
15            "field" : "program.name" ,
16            "value" : [
17                "TCGA"
18            ]
19        }
20    }]
21 }

```

```

1 curl
  'https://api.gdc.cancer.gov/projects?filters=%7B%22op%22%3A%22and%22%2C%22content%22%3A%5B%7B%22op%22%3A%22i

```

Chapter 9

Appendix A: Available Fields

Appendix A: Available Fields

The GDC API's search and retrieval endpoints provide access to fields that correspond to properties defined in the GDC Data Dictionary. This appendix contains a list of fields available at each endpoint, and a list of field groups accessible via the [expand parameter](#).

Field Listing by Endpoint

Project Fields

Field Name

dbgap_accession_number

disease_type

name

primary_site

project_id

released

state

program.dbgap_accession_number

program.name

program.program_id

summary.case_count

summary.file_count

summary.file_size

summary.data_categories.case_count

summary.data_categories.data_category

summary.data_categories.file_count

summary.experimental_strategies.case_count
--

summary.experimental_strategies.experimental_strategy

summary.experimental_strategies.file_count
--

Case Fields

Field Name |
— |
aliquot_ids |
analyte_ids |
case_id |
created_datetime |
days_to_index |
portion_ids |
sample_ids |
slide_ids |
state |
submitter_aliquot_ids |
submitter_analyte_ids |
submitter_id |
submitter_portion_ids |
submitter_sample_ids |
submitter_slide_ids |
updated_datetime |
annotations.annotation_id |
annotations.case_id |
annotations.case_submitter_id |
annotations.category |
annotations.classification |
annotations.created_datetime |
annotations.creator |
annotations.entity_id |
annotations.entity_submitter_id |
annotations.entity_type |
annotations.legacy_created_datetime |
annotations.legacy_updated_datetime |
annotations.notes |
annotations.state |
annotations.status |
annotations.submitter_id |
annotations.updated_datetime |
demographic.created_datetime |
demographic.demographic_id |
demographic.ethnicity |
demographic.gender |
demographic.race |
demographic.state |
demographic.submitter_id |
demographic.updated_datetime |
demographic.year_of_birth |
demographic.year_of_death |
diagnoses.age_at_diagnosis |
diagnoses.classification_of_tumor |
diagnoses.created_datetime |
diagnoses.days_to_birth |
diagnoses.days_to_death |
diagnoses.days_to_last_follow_up |
diagnoses.days_to_last_known_disease_status |
diagnoses.days_to_recurrence |
diagnoses.diagnosis_id |
diagnoses.last_known_disease_status |
diagnoses.morphology |

diagnoses.primary_diagnosis |
diagnoses.prior_malignancy |
diagnoses.progression_or_recurrence |
diagnoses.site_of_resection_or_biopsy |
diagnoses.state |
diagnoses.submitter_id |
diagnoses.tissue_or_organ_of_origin |
diagnoses.tumor_grade |
diagnoses.tumor_stage |
diagnoses.updated_datetime |
diagnoses.vital_status |
diagnoses.treatments.created_datetime |
diagnoses.treatments.days_to_treatment |
diagnoses.treatments.state |
diagnoses.treatments.submitter_id |
diagnoses.treatments.therapeutic_agents |
diagnoses.treatments.treatment_id |
diagnoses.treatments.treatment_intent_type |
diagnoses.treatments.treatment_or_therapy |
diagnoses.treatments.updated_datetime |
exposures.alcohol_history |
exposures.alcohol_intensity |
exposures.bmi |
exposures.cigarettes_per_day |
exposures.created_datetime |
exposures.exposure_id |
exposures.height |
exposures.state |
exposures.submitter_id |
exposures.updated_datetime |
exposures.weight |
exposures.years_smoked |
family_histories.created_datetime |
family_histories.family_history_id |
family_histories.relationship_age_at_diagnosis |
family_histories.relationship_gender |
family_histories.relationship_primary_diagnosis |
family_histories.relationship_type |
family_histories.relative_with_cancer_history |
family_histories.state |
family_histories.submitter_id |
family_histories.updated_datetime |
files.access |
files.acl |
files.created_datetime |
files.data_category |
files.data_format |
files.data_type |
files.error_type |
files.experimental_strategy |
files.file_id |
files.file_name |
files.file_size |
files.file_state |
files.md5sum |
files.origin |
files.platform |
files.revision |

files.state |
files.state_comment |
files.submitter_id |
files.tags |
files.type |
files.updated_datetime |
files.analysis.analysis_id |
files.analysis.analysis_type |
files.analysis.created_datetime |
files.analysis.state |
files.analysis.submitter_id |
files.analysis.updated_datetime |
files.analysis.workflow_end_datetime |
files.analysis.workflow_link |
files.analysis.workflow_start_datetime |
files.analysis.workflow_type |
files.analysis.workflow_version |
files.analysis.input_files.access |
files.analysis.input_files.created_datetime |
files.analysis.input_files.data_category |
files.analysis.input_files.data_format |
files.analysis.input_files.data_type |
files.analysis.input_files.error_type |
files.analysis.input_files.experimental_strategy |
files.analysis.input_files.file_id |
files.analysis.input_files.file_name |
files.analysis.input_files.file_size |
files.analysis.input_files.file_state |
files.analysis.input_files.md5sum |
files.analysis.input_files.platform |
files.analysis.input_files.revision |
files.analysis.input_files.state |
files.analysis.input_files.state_comment |
files.analysis.input_files.submitter_id |
files.analysis.input_files.updated_datetime |
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samples.portions.analytes.aliquots.concentration |
samples.portions.analytes.aliquots.created__datetime |
samples.portions.analytes.aliquots.source_center |
samples.portions.analytes.aliquots.state |
samples.portions.analytes.aliquots.submitter__id |
samples.portions.analytes.aliquots.updated__datetime |
samples.portions.analytes.aliquots.annotations.annotation__id |
samples.portions.analytes.aliquots.annotations.case__id |
samples.portions.analytes.aliquots.annotations.case_submitter__id |
samples.portions.analytes.aliquots.annotations.category |
samples.portions.analytes.aliquots.annotations.classification |
samples.portions.analytes.aliquots.annotations.created__datetime |
samples.portions.analytes.aliquots.annotations.creator |
samples.portions.analytes.aliquots.annotations.entity__id |
samples.portions.analytes.aliquots.annotations.entity__submitter_id |
samples.portions.analytes.aliquots.annotations.entity__type |
samples.portions.analytes.aliquots.annotations.legacy__created__datetime |
samples.portions.analytes.aliquots.annotations.legacy__updated__datetime |
samples.portions.analytes.aliquots.annotations.notes |
samples.portions.analytes.aliquots.annotations.state |

samples.portions.analytes.aliquots.annotations.status |
samples.portions.analytes.aliquots.annotations.submitter_id |
samples.portions.analytes.aliquots.annotations.updated_datetime |
samples.portions.analytes.aliquots.center.center_id |
samples.portions.analytes.aliquots.center.center_type |
samples.portions.analytes.aliquots.center.code |
samples.portions.analytes.aliquots.center.name |
samples.portions.analytes.aliquots.center.namespace |
samples.portions.analytes.aliquots.center.short_name |
samples.portions.analytes.annotations.annotation_id |
samples.portions.analytes.annotations.case_id |
samples.portions.analytes.annotations.case_submitter_id |
samples.portions.analytes.annotations.category |
samples.portions.analytes.annotations.classification |
samples.portions.analytes.annotations.created_datetime |
samples.portions.analytes.annotations.creator |
samples.portions.analytes.annotations.entity_id |
samples.portions.analytes.annotations.entity_submitter_id |
samples.portions.analytes.annotations.entity_type |
samples.portions.analytes.annotations.legacy_created_datetime |
samples.portions.analytes.annotations.legacy_updated_datetime |
samples.portions.analytes.annotations.notes |
samples.portions.analytes.annotations.state |
samples.portions.analytes.annotations.status |
samples.portions.analytes.annotations.submitter_id |
samples.portions.analytes.annotations.updated_datetime |
samples.portions.annotations.annotation_id |
samples.portions.annotations.case_id |
samples.portions.annotations.case_submitter_id |
samples.portions.annotations.category |
samples.portions.annotations.classification |
samples.portions.annotations.created_datetime |
samples.portions.annotations.creator |
samples.portions.annotations.entity_id |
samples.portions.annotations.entity_submitter_id |
samples.portions.annotations.entity_type |
samples.portions.annotations.legacy_created_datetime |
samples.portions.annotations.legacy_updated_datetime |
samples.portions.annotations.notes |
samples.portions.annotations.state |
samples.portions.annotations.status |
samples.portions.annotations.submitter_id |
samples.portions.annotations.updated_datetime |
samples.portions.center.center_id |
samples.portions.center.center_type |
samples.portions.center.code |
samples.portions.center.name |
samples.portions.center.namespace |
samples.portions.center.short_name |
samples.portions.slides.created_datetime |
samples.portions.slides.number_proliferating_cells |
samples.portions.slides.percent_eosinophil_infiltration |
samples.portions.slides.percent_granulocyte_infiltration |
samples.portions.slides.percent_inflam_infiltration |
samples.portions.slides.percent_lymphocyte_infiltration |
samples.portions.slides.percent_monocyte_infiltration |
samples.portions.slides.percent_necrosis |
samples.portions.slides.percent_neutrophil_infiltration |

samples.portions.slides.percent_normal_cells |
samples.portions.slides.percent_stromal_cells |
samples.portions.slides.percent_tumor_cells |
samples.portions.slides.percent_tumor_nuclei |
samples.portions.slides.section_location |
samples.portions.slides.slide_id |
samples.portions.slides.state |
samples.portions.slides.submitter_id |
samples.portions.slides.updated_datetime |
samples.portions.slides.annotations.annotation_id |
samples.portions.slides.annotations.case_id |
samples.portions.slides.annotations.case_submitter_id |
samples.portions.slides.annotations.category |
samples.portions.slides.annotations.classification |
samples.portions.slides.annotations.created_datetime |
samples.portions.slides.annotations.creator |
samples.portions.slides.annotations.entity_id |
samples.portions.slides.annotations.entity_submitter_id |
samples.portions.slides.annotations.entity_type |
samples.portions.slides.annotations.legacy_created_datetime |
samples.portions.slides.annotations.legacy_updated_datetime |
samples.portions.slides.annotations.notes |
samples.portions.slides.annotations.state |
samples.portions.slides.annotations.status |
samples.portions.slides.annotations.submitter_id |
samples.portions.slides.annotations.updated_datetime |
summary.file_count |
summary.file_size |
summary.data_categories.data_category |
summary.data_categories.file_count |
summary.experimental_strategies.experimental_strategy |
summary.experimental_strategies.file_count |
tissue_source_site.bcr_id |
tissue_source_site.code |
tissue_source_site.name |
tissue_source_site.project |
tissue_source_site.tissue_source_site_id |

File Fields

Field Name
access
acl
created_datetime
data_category
data_format
data_type
error_type
experimental_strategy
file_id
file_name
file_size

Field Name

file_state
md5sum
origin
platform
revision
state
state_comment
submitter_id
tags
type
updated_datetime
analysis.analysis_id
analysis.analysis_type
analysis.created_datetime
analysis.state
analysis.submitter_id
analysis.updated_datetime
analysis.workflow_end_datetime
analysis.workflow_link
analysis.workflow_start_datetime
analysis.workflow_type
analysis.workflow_version
analysis.input_files.access
analysis.input_files.created_datetime
analysis.input_files.data_category
analysis.input_files.data_format
analysis.input_files.data_type
analysis.input_files.error_type
analysis.input_files.experimental_strategy
analysis.input_files.file_id
analysis.input_files.file_name
analysis.input_files.file_size
analysis.input_files.file_state
analysis.input_files.md5sum
analysis.input_files.platform
analysis.input_files.revision
analysis.input_files.state
analysis.input_files.state_comment
analysis.input_files.submitter_id

Field Name

analysis.input_files.updated_datetime
analysis.metadata.read_groups.adapter_name
analysis.metadata.read_groups.adapter_sequence
analysis.metadata.read_groups.base_caller_name
analysis.metadata.read_groups.base_caller_version
analysis.metadata.read_groups.created_datetime
analysis.metadata.read_groups.experiment_name
analysis.metadata.read_groups.flow_cell_barcode
analysis.metadata.read_groups.includes_spike_ins
analysis.metadata.read_groups.instrument_model
analysis.metadata.read_groups.is_paired_end
analysis.metadata.read_groups.library_name
analysis.metadata.read_groups.library_preparation_kit_catalog_number
analysis.metadata.read_groups.library_preparation_kit_name
analysis.metadata.read_groups.library_preparation_kit_vendor
analysis.metadata.read_groups.library_preparation_kit_version
analysis.metadata.read_groups.library_selection
analysis.metadata.read_groups.library_strand
analysis.metadata.read_groups.library_strategy
analysis.metadata.read_groups.platform
analysis.metadata.read_groups.read_group_id
analysis.metadata.read_groups.read_group_name
analysis.metadata.read_groups.read_length
analysis.metadata.read_groups.RIN
analysis.metadata.read_groups.sequencing_center
analysis.metadata.read_groups.sequencing_date
analysis.metadata.read_groups.size_selection_range
analysis.metadata.read_groups.spike_ins_concentration
analysis.metadata.read_groups.spike_ins_fasta
analysis.metadata.read_groups.state
analysis.metadata.read_groups.submitter_id
analysis.metadata.read_groups.target_capture_kit_catalog_number
analysis.metadata.read_groups.target_capture_kit_name
analysis.metadata.read_groups.target_capture_kit_target_region
analysis.metadata.read_groups.target_capture_kit_vendor
analysis.metadata.read_groups.target_capture_kit_version
analysis.metadata.read_groups.to_trim_adapter_sequence
analysis.metadata.read_groups.updated_datetime
analysis.metadata.read_groups.read_group_qcs.adapter_content

Field Name

analysis.metadata.read_groups.read_group_qcs.basic_statistics
analysis.metadata.read_groups.read_group_qcs.created_datetime
analysis.metadata.read_groups.read_group_qcs.encoding
analysis.metadata.read_groups.read_group_qcs.fastq_name
analysis.metadata.read_groups.read_group_qcs.kmer_content
analysis.metadata.read_groups.read_group_qcs.overrepresented_sequences
analysis.metadata.read_groups.read_group_qcs.per_base_n_content
analysis.metadata.read_groups.read_group_qcs.per_base_sequence_content
analysis.metadata.read_groups.read_group_qcs.per_base_sequence_quality
analysis.metadata.read_groups.read_group_qcs.per_sequence_gc_content
analysis.metadata.read_groups.read_group_qcs.per_sequence_quality_score
analysis.metadata.read_groups.read_group_qcs.per_tile_sequence_quality
analysis.metadata.read_groups.read_group_qcs.percent_gc_content
analysis.metadata.read_groups.read_group_qcs.read_group_qc_id
analysis.metadata.read_groups.read_group_qcs.sequence_duplication_levels
analysis.metadata.read_groups.read_group_qcs.sequence_length_distribution
analysis.metadata.read_groups.read_group_qcs.state
analysis.metadata.read_groups.read_group_qcs.submitter_id
analysis.metadata.read_groups.read_group_qcs.total_sequences
analysis.metadata.read_groups.read_group_qcs.updated_datetime
analysis.metadata.read_groups.read_group_qcs.workflow_end_datetime
analysis.metadata.read_groups.read_group_qcs.workflow_link
analysis.metadata.read_groups.read_group_qcs.workflow_start_datetime
analysis.metadata.read_groups.read_group_qcs.workflow_type
analysis.metadata.read_groups.read_group_qcs.workflow_version
annotations.annotation_id
annotations.case_id
annotations.case_submitter_id
annotations.category
annotations.classification
annotations.created_datetime
annotations.creator
annotations.entity_id
annotations.entity_submitter_id
annotations.entity_type
annotations.legacy_created_datetime
annotations.legacy_updated_datetime
annotations.notes
annotations.state

Field Name

annotations.status
annotations.submitter_id
annotations.updated_datetime
archive.archive_id
archive.created_datetime
archive.data_category
archive.data_format
archive.data_type
archive.error_type
archive.file_name
archive.file_size
archive.file_state
archive.md5sum
archive.revision
archive.state
archive.state_comment
archive.submitter_id
archive.updated_datetime
associated_entities.case_id
associated_entities.entity_id
associated_entities.entity_submitter_id
associated_entities.entity_type
cases.aliquot_ids
cases.analyte_ids
cases.case_id
cases.created_datetime
cases.days_to_index
cases.portion_ids
cases.sample_ids
cases.slide_ids
cases.state
cases.submitter_aliquot_ids
cases.submitter_analyte_ids
cases.submitter_id
cases.submitter_portion_ids
cases.submitter_sample_ids
cases.submitter_slide_ids
cases.updated_datetime
cases.annotations.annotation_id

Field Name

cases.annotations.case_id
cases.annotations.case_submitter_id
cases.annotations.category
cases.annotations.classification
cases.annotations.created_datetime
cases.annotations.creator
cases.annotations.entity_id
cases.annotations.entity_submitter_id
cases.annotations.entity_type
cases.annotations.legacy_created_datetime
cases.annotations.legacy_updated_datetime
cases.annotations.notes
cases.annotations.state
cases.annotations.status
cases.annotations.submitter_id
cases.annotations.updated_datetime
cases.demographic.created_datetime
cases.demographic.demographic_id
cases.demographic.ethnicity
cases.demographic.gender
cases.demographic.race
cases.demographic.state
cases.demographic.submitter_id
cases.demographic.updated_datetime
cases.demographic.year_of_birth
cases.demographic.year_of_death
cases.diagnoses.age_at_diagnosis
cases.diagnoses.classification_of_tumor
cases.diagnoses.created_datetime
cases.diagnoses.days_to_birth
cases.diagnoses.days_to_death
cases.diagnoses.days_to_last_follow_up
cases.diagnoses.days_to_last_known_disease_status
cases.diagnoses.days_to_recurrence
cases.diagnoses.diagnosis_id
cases.diagnoses.last_known_disease_status
cases.diagnoses.morphology
cases.diagnoses.primary_diagnosis
cases.diagnoses.prior_malignancy

Field Name

cases.diagnoses.progression_or_recurrence
cases.diagnoses.site_of_resection_or_biopsy
cases.diagnoses.state
cases.diagnoses.submitter_id
cases.diagnoses.tissue_or_organ_of_origin
cases.diagnoses.tumor_grade
cases.diagnoses.tumor_stage
cases.diagnoses.updated_datetime
cases.diagnoses.vital_status
cases.diagnoses.treatments.created_datetime
cases.diagnoses.treatments.days_to_treatment
cases.diagnoses.treatments.state
cases.diagnoses.treatments.submitter_id
cases.diagnoses.treatments.therapeutic_agents
cases.diagnoses.treatments.treatment_id
cases.diagnoses.treatments.treatment_intent_type
cases.diagnoses.treatments.treatment_or_therapy
cases.diagnoses.treatments.updated_datetime
cases.exposures.alcohol_history
cases.exposures.alcohol_intensity
cases.exposures.bmi
cases.exposures.cigarettes_per_day
cases.exposures.created_datetime
cases.exposures.exposure_id
cases.exposures.height
cases.exposures.state
cases.exposures.submitter_id
cases.exposures.updated_datetime
cases.exposures.weight
cases.exposures.years_smoked
cases.family_histories.created_datetime
cases.family_histories.family_history_id
cases.family_histories.relationship_age_at_diagnosis
cases.family_histories.relationship_gender
cases.family_histories.relationship_primary_diagnosis
cases.family_histories.relationship_type
cases.family_histories.relative_with_cancer_history
cases.family_histories.state
cases.family_histories.submitter_id

Field Name

cases.family_histories.updated_datetime
cases.files.created_datetime
cases.files.error_type
cases.files.file_id
cases.files.file_name
cases.files.file_size
cases.files.file_state
cases.files.md5sum
cases.files.state
cases.files.state_comment
cases.files.submitter_id
cases.files.updated_datetime
cases.project.dbgap_accession_number
cases.project.disease_type
cases.project.name
cases.project.primary_site
cases.project.project_id
cases.project.released
cases.project.state
cases.project.program.dbgap_accession_number
cases.project.program.name
cases.project.program.program_id
cases.samples.composition
cases.samples.created_datetime
cases.samples.current_weight
cases.samples.days_to_collection
cases.samples.days_to_sample_procurement
cases.samples.freezing_method
cases.samples.initial_weight
cases.samples.intermediate_dimension
cases.samples.is_ffpe
cases.samples.longest_dimension
cases.samples.oct_embedded
cases.samples.pathology_report_uuid
cases.samples.preservation_method
cases.samples.sample_id
cases.samples.sample_type
cases.samples.sample_type_id
cases.samples.shortest_dimension

Field Name

cases.samples.state
cases.samples.submitter_id
cases.samples.time_between_clamping_and_freezing
cases.samples.time_between_excision_and_freezing
cases.samples.tissue_type
cases.samples.tumor_code
cases.samples.tumor_code_id
cases.samples.tumor_descriptor
cases.samples.updated_datetime
cases.samples.annotations.annotation_id
cases.samples.annotations.case_id
cases.samples.annotations.case_submitter_id
cases.samples.annotations.category
cases.samples.annotations.classification
cases.samples.annotations.created_datetime
cases.samples.annotations.creator
cases.samples.annotations.entity_id
cases.samples.annotations.entity_submitter_id
cases.samples.annotations.entity_type
cases.samples.annotations.legacy_created_datetime
cases.samples.annotations.legacy_updated_datetime
cases.samples.annotations.notes
cases.samples.annotations.state
cases.samples.annotations.status
cases.samples.annotations.submitter_id
cases.samples.annotations.updated_datetime
cases.samples.portions.created_datetime
cases.samples.portions.creation_datetime
cases.samples.portions.is_ffpe
cases.samples.portions.portion_id
cases.samples.portions.portion_number
cases.samples.portions.state
cases.samples.portions.submitter_id
cases.samples.portions.updated_datetime
cases.samples.portions.weight
cases.samples.portions.analytes.a260_a280_ratio
cases.samples.portions.analytes.amount
cases.samples.portions.analytes.analyte_id
cases.samples.portions.analytes.analyte_type

Field Name

cases.samples.portions.analytes.analyte__type__id
cases.samples.portions.analytes.concentration
cases.samples.portions.analytes.created__datetime
cases.samples.portions.analytes.spectrophotometer__method
cases.samples.portions.analytes.state
cases.samples.portions.analytes.submitter__id
cases.samples.portions.analytes.updated__datetime
cases.samples.portions.analytes.well__number
cases.samples.portions.analytes.aliquots.aliquot__id
cases.samples.portions.analytes.aliquots.amount
cases.samples.portions.analytes.aliquots.analyte__type
cases.samples.portions.analytes.aliquots.analyte__type__id
cases.samples.portions.analytes.aliquots.concentration
cases.samples.portions.analytes.aliquots.created__datetime
cases.samples.portions.analytes.aliquots.source__center
cases.samples.portions.analytes.aliquots.state
cases.samples.portions.analytes.aliquots.submitter__id
cases.samples.portions.analytes.aliquots.updated__datetime
cases.samples.portions.analytes.aliquots.annotations.annotation__id
cases.samples.portions.analytes.aliquots.annotations.case__id
cases.samples.portions.analytes.aliquots.annotations.case__submitter__id
cases.samples.portions.analytes.aliquots.annotations.category
cases.samples.portions.analytes.aliquots.annotations.classification
cases.samples.portions.analytes.aliquots.annotations.created__datetime
cases.samples.portions.analytes.aliquots.annotations.creator
cases.samples.portions.analytes.aliquots.annotations.entity__id
cases.samples.portions.analytes.aliquots.annotations.entity__submitter__id
cases.samples.portions.analytes.aliquots.annotations.entity__type
cases.samples.portions.analytes.aliquots.annotations.legacy__created__datetime
cases.samples.portions.analytes.aliquots.annotations.legacy__updated__datetime
cases.samples.portions.analytes.aliquots.annotations.notes
cases.samples.portions.analytes.aliquots.annotations.state
cases.samples.portions.analytes.aliquots.annotations.status
cases.samples.portions.analytes.aliquots.annotations.submitter__id
cases.samples.portions.analytes.aliquots.annotations.updated__datetime
cases.samples.portions.analytes.aliquots.center.center__id
cases.samples.portions.analytes.aliquots.center.center__type
cases.samples.portions.analytes.aliquots.center.code
cases.samples.portions.analytes.aliquots.center.name

Field Name

cases.samples.portions.analytes.aliquots.center.namespace
cases.samples.portions.analytes.aliquots.center.short_name
cases.samples.portions.analytes.annotations.annotation_id
cases.samples.portions.analytes.annotations.case_id
cases.samples.portions.analytes.annotations.case_submitter_id
cases.samples.portions.analytes.annotations.category
cases.samples.portions.analytes.annotations.classification
cases.samples.portions.analytes.annotations.created_datetime
cases.samples.portions.analytes.annotations.creator
cases.samples.portions.analytes.annotations.entity_id
cases.samples.portions.analytes.annotations.entity_submitter_id
cases.samples.portions.analytes.annotations.entity_type
cases.samples.portions.analytes.annotations.legacy_created_datetime
cases.samples.portions.analytes.annotations.legacy_updated_datetime
cases.samples.portions.analytes.annotations.notes
cases.samples.portions.analytes.annotations.state
cases.samples.portions.analytes.annotations.status
cases.samples.portions.analytes.annotations.submitter_id
cases.samples.portions.analytes.annotations.updated_datetime
cases.samples.portions.annotations.annotation_id
cases.samples.portions.annotations.case_id
cases.samples.portions.annotations.case_submitter_id
cases.samples.portions.annotations.category
cases.samples.portions.annotations.classification
cases.samples.portions.annotations.created_datetime
cases.samples.portions.annotations.creator
cases.samples.portions.annotations.entity_id
cases.samples.portions.annotations.entity_submitter_id
cases.samples.portions.annotations.entity_type
cases.samples.portions.annotations.legacy_created_datetime
cases.samples.portions.annotations.legacy_updated_datetime
cases.samples.portions.annotations.notes
cases.samples.portions.annotations.state
cases.samples.portions.annotations.status
cases.samples.portions.annotations.submitter_id
cases.samples.portions.annotations.updated_datetime
cases.samples.portions.center.center_id
cases.samples.portions.center.center_type
cases.samples.portions.center.code

Field Name

cases.samples.portions.center.name
cases.samples.portions.center.namespace
cases.samples.portions.center.short_name
cases.samples.portions.slides.created_datetime
cases.samples.portions.slides.number_proliferating_cells
cases.samples.portions.slides.percent_eosinophil_infiltration
cases.samples.portions.slides.percent_granulocyte_infiltration
cases.samples.portions.slides.percent_inflam_infiltration
cases.samples.portions.slides.percent_lymphocyte_infiltration
cases.samples.portions.slides.percent_monocyte_infiltration
cases.samples.portions.slides.percent_necrosis
cases.samples.portions.slides.percent_neutrophil_infiltration
cases.samples.portions.slides.percent_normal_cells
cases.samples.portions.slides.percent_stromal_cells
cases.samples.portions.slides.percent_tumor_cells
cases.samples.portions.slides.percent_tumor_nuclei
cases.samples.portions.slides.section_location
cases.samples.portions.slides.slide_id
cases.samples.portions.slides.state
cases.samples.portions.slides.submitter_id
cases.samples.portions.slides.updated_datetime
cases.samples.portions.slides.annotations.annotation_id
cases.samples.portions.slides.annotations.case_id
cases.samples.portions.slides.annotations.case_submitter_id
cases.samples.portions.slides.annotations.category
cases.samples.portions.slides.annotations.classification
cases.samples.portions.slides.annotations.created_datetime
cases.samples.portions.slides.annotations.creator
cases.samples.portions.slides.annotations.entity_id
cases.samples.portions.slides.annotations.entity_submitter_id
cases.samples.portions.slides.annotations.entity_type
cases.samples.portions.slides.annotations.legacy_created_datetime
cases.samples.portions.slides.annotations.legacy_updated_datetime
cases.samples.portions.slides.annotations.notes
cases.samples.portions.slides.annotations.state
cases.samples.portions.slides.annotations.status
cases.samples.portions.slides.annotations.submitter_id
cases.samples.portions.slides.annotations.updated_datetime
cases.summary.file_count

Field Name

cases.summary.file_size
cases.summary.data_categories.data_category
cases.summary.data_categories.file_count
cases.summary.experimental_strategies.experimental_strategy
cases.summary.experimental_strategies.file_count
cases.tissue_source_site.bcr_id
cases.tissue_source_site.code
cases.tissue_source_site.name
cases.tissue_source_site.project
cases.tissue_source_site.tissue_source_site_id
center.center_id
center.center_type
center.code
center.name
center.namespace
center.short_name
downstream_analyses.analysis_id
downstream_analyses.analysis_type
downstream_analyses.created_datetime
downstream_analyses.state
downstream_analyses.submitter_id
downstream_analyses.updated_datetime
downstream_analyses.workflow_end_datetime
downstream_analyses.workflow_link
downstream_analyses.workflow_start_datetime
downstream_analyses.workflow_type
downstream_analyses.workflow_version
downstream_analyses.output_files.access
downstream_analyses.output_files.created_datetime
downstream_analyses.output_files.data_category
downstream_analyses.output_files.data_format
downstream_analyses.output_files.data_type
downstream_analyses.output_files.error_type
downstream_analyses.output_files.experimental_strategy
downstream_analyses.output_files.file_id
downstream_analyses.output_files.file_name
downstream_analyses.output_files.file_size
downstream_analyses.output_files.file_state
downstream_analyses.output_files.md5sum

Field Name

downstream_analyses.output_files.platform
downstream_analyses.output_files.revision
downstream_analyses.output_files.state
downstream_analyses.output_files.state_comment
downstream_analyses.output_files.submitter_id
downstream_analyses.output_files.updated_datetime
index_files.access
index_files.created_datetime
index_files.data_category
index_files.data_format
index_files.data_type
index_files.error_type
index_files.experimental_strategy
index_files.file_id
index_files.file_name
index_files.file_size
index_files.file_state
index_files.md5sum
index_files.platform
index_files.revision
index_files.state
index_files.state_comment
index_files.submitter_id
index_files.updated_datetime
metadata_files.access
metadata_files.created_datetime
metadata_files.data_category
metadata_files.data_format
metadata_files.data_type
metadata_files.error_type
metadata_files.file_id
metadata_files.file_name
metadata_files.file_size
metadata_files.file_state
metadata_files.md5sum
metadata_files.state
metadata_files.state_comment
metadata_files.submitter_id
metadata_files.type

Field Name
metadata_files.updated_datetime

Annotation Fields

Field Name
—
annotation_id
case_id
case_submitter_id
category
classification
created_datetime
entity_id
entity_submitter_id
entity_type
legacy_created_datetime
legacy_updated_datetime
notes
state
status
submitter_id
updated_datetime
project.code
project.dbgap_accession_number
project.disease_type
project.name
project.primary_site
project.program.dbgap_accession_number
project.program.name
project.program.program_id
project.project_id
project.released
project.state

Field Group Listing by Endpoint

Projects Field Groups

Field Group Name
program
summary
summary.data_categories
summary.experimental_strategies

Cases Field Groups

Field Group Name

annotations
demographic
diagnoses
diagnoses.treatments
exposures
family_histories
files
files.analysis
files.analysis.input_files
files.analysis.metadata
files.analysis.metadata.read_groups
files.analysis.metadata.read_groups.read_group_qcs
files.archive
files.cases
files.cases.annotations
files.cases.demographic
files.cases.diagnoses
files.cases.diagnoses.treatments
files.cases.exposures
files.cases.family_histories
files.cases.files
files.cases.project
files.cases.project.program
files.cases.samples
files.cases.samples.annotations
files.cases.samples.portions
files.cases.samples.portions.analytes
files.cases.samples.portions.analytes.aliquots
files.cases.samples.portions.analytes.aliquots.annotations
files.cases.samples.portions.analytes.aliquots.center
files.cases.samples.portions.analytes.annotations
files.cases.samples.portions.annotations
files.cases.samples.portions.center
files.cases.samples.portions.slides
files.cases.samples.portions.slides.annotations
files.cases.summary
files.cases.summary.data_categories
files.cases.summary.experimental_strategies
files.cases.tissue_source_site

Field Group Name
files.center
files.downstream_analyses
files.downstream_analyses.output_files
files.index_files
files.metadata_files
project
project.program
samples
samples.annotations
samples.portions
samples.portions.analytes
samples.portions.analytes.aliquots
samples.portions.analytes.aliquots.annotations
samples.portions.analytes.aliquots.center
samples.portions.analytes.annotations
samples.portions.annotations
samples.portions.center
samples.portions.slides
samples.portions.slides.annotations
summary
summary.data_categories
summary.experimental_strategies
tissue_source_site

Files Field Groups

Field Group Name
analysis
analysis.input_files
analysis.metadata
analysis.metadata.read_groups
analysis.metadata.read_groups.read_group_qcs
annotations
archive
associated_entities
cases
cases.annotations
cases.demographic
cases.diagnoses

Field Group Name

cases.diagnoses.treatments
cases.exposures
cases.family_histories
cases.files
cases.project
cases.project.program
cases.samples
cases.samples.annotations
cases.samples.portions
cases.samples.portions.analytes
cases.samples.portions.analytes.aliquots
cases.samples.portions.analytes.aliquots.annotations
cases.samples.portions.analytes.aliquots.center
cases.samples.portions.analytes.annotations
cases.samples.portions.annotations
cases.samples.portions.center
cases.samples.portions.slides
cases.samples.portions.slides.annotations
cases.summary
cases.summary.data_categories
cases.summary.experimental_strategies
cases.tissue_source_site
center
downstream_analyses
downstream_analyses.output_files
index_files
metadata_files

Annotations Field Groups

Field Group Name

project
project.program

Chapter 10

Appendix B: Key Terms

Appendix B: Key Terms

The following table provides definitions and explanations for terms and acronyms relevant to the content presented within this document.

Term	Definition
ACL	Access Control List
API	Application Programming Interface
BAM	Bidirectional Associative Memory
BCR	Biospecimen Core Resource
CSV	Comma Separated Values
DCC	Data Coordinating Center
eRA	Electronic Research Administration
GDC	Genomic Data Commons
HTTP	Hypertext Transfer Protocol
IDE	Integrated Development Environment
JSON	JavaScript Object Notation
MAGE-TAB	Microarray Gene Expression - Tabular format
NCI	National Cancer Institute
NIH	National Institutes of Health
Op	Operations
REST	Representational State Transfer
TARGET	Therapeutically Applicable Research to Generate Effective Treatments
TCGA	The Cancer Genome Atlas
TSV	Tab Separated Values
UUID	Universally Unique Identifier
URL	Universal Resource Locator
XML	Extensible Markup Language

Chapter 11

Appendix C: Format of Submission Queries and Responses

Appendix C: Format of Submission Requests and Responses

Format of Submission Request

The general format of JSON objects submitted to the GDC API is as follows:

```
1 {
2   "type": string,
3   "id": string,
4   "submitter_id": string,
5   "<properties>": any type,
6   "<relationship_name>": [
7     {
8       "id": string,
9       "submitter_id": string
10    },
11    ...
12  ]
13 }
```

The request must specify either an **id** or a **submitter_id**.

id: A string specifying the **id** of the node that the user is creating or updating. This is the persistent GDC UUID4 for the node. If it is preferred to refer to the node using a custom id, users can do so with the **submitter_id** field (described below).

submitter_id: A string specifying the custom id of the object the user is creating or updating. This is not the official GDC ID for the node.

<properties>: These key-value pairs will be applied to properties on the referenced node.

<relationship_name>: A JSON object that specifies a relationship (link) between the node and other nodes. Links are typically established using the **submitter_id** or **id** of the neighboring node.

Format of API Response to a Submission Request

The following fields are included in all API responses to submission requests.

```
1 {
2   "cases_related_to_created_entities_count": int,
3   "cases_related_to_updated_entities_count": int,
```

```

4  "code": int,
5  "created_entity_count": int,
6  "entities": [entities],
7  "entity_error_count": int,
8  "message": string,
9  "success": boolean,
10 "transaction_id": string,
11 "transactional_error_count": int,
12 "transactional_errors": [transactional_errors],
13 "updated_entity_count": int
14 }

```

cases_related_to_created_entities_count: Number of cases related to the created entities.

cases_related_to_updated_entities_count: Number of cases related to the updated entities.

code: The HTTP status code of the response message.

created_entity_count: Number of entities created.

entities: A list of entities of the form:

```

1 {
2   "action": string,
3   "errors": [entity_errors],
4   "id": string,
5   "related_cases": [object],
6   "type": string,
7   "unique_keys": [unique_keys],
8   "valid": boolean,
9   "warnings": [object]
10 }

```

entity_errors: A list of errors that occurred while parsing, validating, or performing a CRUD operation on a specific entity. Entity errors are of the form:

```

1 {
2   "keys": [string],
3   "message": string
4 }

```

unique_keys: Properties, or combinations of properties, that can be used to uniquely identify the node in the GDC. Unique_keys are of the form:

```

1 {
2   "project_id": string,
3   "submitter_id": string
4 }

```

entity_error_count: Number of entities that were not successful.

message: A human-readable message describing the transaction.

success: A boolean value stating whether the transaction was successful. If the value is False, then no changes will be made to the database.

transaction_id: A string specifying the transaction id.

transactional_error_count: Number of transactional errors that occurred.

transactional_errors: A list of transactional errors that have occurred. These errors are errors that are not specific to an individual entity. Transactional errors are of the form:

```

1 {
2   "message": string
3 }

```

updated_entity_count: Number of existing entities updated by the transaction.

Error Types

EntityNotFoundError A referenced entity was not found among existing entities and entities specified in the transaction.

MissingPropertyError A required property was not provided.

ValidationError A provided property did not pass a validation test.

Status Messages

API responses will contain a status for each entity specified in the request:

success: The desired transaction was successful and the entity's state was modified in the GDC.

valid: The desired transaction was not successful, but the transaction was not aborted because of this entity.

error: The desired transaction was not successful, and the transaction was aborted because of this entity. This entity did not pass validation or an internal error occurred when attempting to complete the transaction. The error state will be accompanied by a list of errors recorded about the entity (see label-error-messages).

Note: GDC API requests are transactional. An error with processing a node specified in the transaction will abort the transaction and will result in no changes being applied for any node involved in the transaction.

Chapter 12

Release Notes

API Release Notes

v1.10.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** August 22, 2017

New Features and Changes

- Longitudinal clinical data can now be submitted to the GDC
- Created new entities and reorganized the location of many properties in the GDC Dictionary. A list of deprecated properties and their new locations can be found [here](#). Note that the deprecated properties still contain all information that they previously did. In a later release we will map the data from the old location to the new. Eventually, we will suspend submission to the old properties and will remove them entirely from the GDC.
- GDC Data Dictionary Changes Details
 - Created follow_up entity to support longitudinal clinical data
 - Deprecated clinical test entity
 - Modified acceptable values for Read Group properties
 - Modified Diagnosis entity
 - Modified Treatment entity
 - Modified Demographic entity
 - Modified Case entity
 - Added new tumor code, tumor id, and sample types to Sample entity to support OCG
 - Added property `days_to_diagnosis` to Diagnosis entity
 - Created Somatic Mutation Index entity
 - Updated CaDSR CDE links in data dictionary
 - Added new sample type `tumor` to sample entity
 - Made `classification_of_tumor` on diagnosis entity non-required
 - Added support for FM-AD to Genomic Profile Harmonization Workflow entity
 - Added data type `Gene Level Copy Number Scores` to Copy Number Segment entity

Known Issues and Workarounds

- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.

- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.9.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** June 29, 2017

New Features and Changes

- Updated ability to search data based on genes and mutations have been released. Discussion of the new endpoints and their use can be found in the Data Portal User Guide. These feature are limited to those projects for which the GDC contains open-access MAF files.
- API request parameter **from** now returns first record when **from=0**. Previously, **from=1** was the first record. **from=0** is now the default.

Known Issues and Workarounds

- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.8.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** May 9, 2017

New Features and Changes

- Users can now control whether a set of files will be compressed or not when downloading. For further details see the [API User Guide](#).

Known Issues and Workarounds

- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.7.1

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** March 16, 2017

New Features and Changes

- Submission: Due to Data Dictionary updates new submission templates may be required for users submitting JSON and TSV formats
- Submission: Entities in submitted state (assigned when the project has been submitted) cannot be deleted.
- Submission: When attempting to delete an entity that has child entities not specified in the request, an error message is generated that will include all of the child entities' UUIDs.
- Submission: Entities associated with files uploaded to the GDC object store cannot be deleted until the associated file has been deleted.
- Re-enable Review, Submit, and Release functions for submission
- GDC Data Dictionary Changes
- Added “submittable” property to all entities
- Changed Read Group to category biospecimen
- Added many new clinical properties available for submission
- Added sample codes from Office of Cancer Genomics (OCG) to analyte and aliquot
- Slides can now be attached to sample rather than just portion
- `sample_type_id` is no longer required when submitting sample entities
- `analyte_type_id` is no longer required when submitting aliquot and analyte entities
- Clinical Test Entity is created for storing results of a variety of potential clinical tests related to the diagnosis -
- Genomic Profiling Report entity created for storing particular derived sequencing results
- Structural Variation entity created
- Project entity includes new field “Intended Release Date”
- Project entity includes new field “Releasable”

Bugs Fixed Since Last Release

- Fixed bug where boolean properties were not accepted with TSV submission

Known Issues and Workarounds

- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.5.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** October 31, 2016

New Features and Changes

- API responds with an error when the request specifies an unsupported combination of `filters` and `facets`.
- In TSV submissions, trailing and leading whitespace, including non-ASCII whitespace characters, are stripped from property names and values.
- For released projects, any updates to previously submitted entities (i.e. `"state": "submitted"`) will be included in the following GDC data release.
- Performance improvements for manifest generation.

Bugs Fixed Since Last Release

- Uploading certain unsupported metadata files caused the associated submission transactions to remain stuck in pending state.

Known Issues and Workarounds

- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.4.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** September 23, 2016

New Features and Changes

- Submission transaction log includes additional information to assist in tracking.
- Submission project state transitions are disabled temporarily while project release features are being improved.
- GDC data dictionary changes:
 - The **submittable** property was added to all entity types in the GDC data model. It indicates whether the entity type can be submitted by users.
 - Category of Read Group entities in the GDC Data Model has changed from **data_bundle** to **biospecimen**.
 - Analyte entities support an expanded set of **analyte_type** values.

Bugs Fixed Since Last Release

- None to report

Known Issues and Workarounds

- API search & retrieval queries that do not include a **sort** parameter may return results in different order each time they are executed. This is a particular problem for paginated responses (i.e. responses to queries for which the number of results is greater than the **size** parameter).
 - **Workaround:** Include a **sort** parameter in API search & retrieval queries.
- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.3.1

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** September 7, 2016

New Features and Changes

- Successful `_dry_run` submission transactions can be committed to the GDC data model without having to re-upload metadata. The transactions can also be closed to prevent them from being committed in the future.
- Submission transactions can be submitted in asynchronous mode. In this mode, the GDC API will issue an immediate acknowledgement of the transaction, along with the `transaction_id`. The status of the transaction can be verified by the user at a later time by specifying the `transaction_id`. Users submitting large transactions may find this mode helpful.
- New submission transaction properties can be queried with GraphQL
- GDC Data Dictionary changes:
 - Clinical Supplement entities can have `data_format` set to OMF.
 - Biospecimen Supplement entities can have `data_format` set to SSF or PPS.
 - Read group `instrument_model` can be set to “Illumina HiSeq 4000”.
 - Category of Slide entities in the GDC Data Model has changed from `data_bundle` to `biospecimen`.

Bugs Fixed Since Last Release

- Incorrect BMI calculation in the import of BCR XML files.

Known Issues and Workarounds

- API search & retrieval queries that do not include a `sort` parameter may return results in different order each time they are executed. This is a particular problem for paginated responses (i.e. responses to queries for which the number of results is greater than the `size` parameter).
 - **Workaround:** Include a `sort` parameter in API search & retrieval queries.
- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.2.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** August 9, 2016

New Features and Changes

- Tarballs generated by the `data` endpoint in response to multi-file data download requests now include a folder structure that puts each file in a folder whose name is the file’s UUID.
- UUIDs in clinical XML files are no longer treated in a case-sensitive way by the `submission` endpoint.
- Improved performance of `submission` endpoint for transactions that include many cases.
- Speed improvements for the `submission` endpoint.
- BCR XML is no longer validated against its XSD at submission.

Bugs Fixed Since Last Release

- Fixed handling of POST requests to address problems with cart functionality in older versions of Firefox
- Files of category `related_files` can now be downloaded from the `data` endpoint.
- Allowed submission by projects in certain dbGaP registration states that were previously blocked.

Known Issues and Workarounds

- API search & retrieval queries that do not include a **sort** parameter may return results in different order each time they are executed. This is a particular problem for paginated responses (i.e. responses to queries for which the number of results is greater than the **size** parameter).
 - **Workaround:** Include a **sort** parameter in API search & retrieval queries.
- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.1.0

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** May 25, 2016

New Features and Changes

- BAM index files (.bai) are now automatically downloaded with parent BAM.

Bugs Fixed Since Last Release

- None to report

Bugs Fixed Since Last Release

- Sorting by file **submitter_id** no longer causes an internal server error
- BAM index files are now included with harmonized BAM files
- Certain very long API requests will time out. It is recommended to break up into a series of smaller requests.

Known Issues and Workarounds

- Fields are not counted as missing if parent field is also missing. This may occur with queries of nested fields in the Data Portal Advanced Search or an API query using a filter. This behavior could impact results reported using search parameters of “IS MISSING” or “NOT MISSING”.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.

v1.0.1

- **GDC Product:** Application Programming Interface (API)
- **Release Date:** May 16, 2016

New Features and Changes

- HTTP interface that uses JSON as the primary data exchange format
- Programmatic access to functionality provided by GDC Data and Submission portals, via **projects**, **cases**, **files**, **annotations**, **data**, **slicing**, **status**, and **submission** endpoints
- Programmatic access to GDC Legacy Archive via **legacy** endpoint
- Token-based authentication for secure access to controlled data and to submission functionality
- RESTful search that supports simple and complex queries via **filters**, **fields**, and **facets** parameters, and **project**, **files**, **cases**, and **annotations** endpoints.
- Search results can be sorted using **sort** parameter, paginated using **size** and **from** parameters, and output in JSON, TSV, and XML using **format** and **pretty** parameters.
- **_mapping** endpoint enables user discovery of fields available for data search and retrieval operations
- Support for downloading of individual files and of archives containing multiple files
- Generation of download and upload manifests for use with the GDC Data Transfer Tool
- BAM slicing functionality for downloading part(s) of a BAM file specified using chromosomal coordinates or HGNC gene names
- Transactional submission system that links individual data elements according to a graph-based GDC Data Model
- Two data entity identifiers: UUIDs, which are consistent across GDC, and Submitter IDs, for compatibility with submitters' tracking systems

Bugs Fixed Since Last Release

- None to report

Known Issues and Workarounds

- Use of non-ascii characters in token passed to Data Transfer Tool will produce incorrect error message “Internal server error: Auth service temporarily unavailable”.
- Use of a decimal in an integer search field produces unexpected error.
- Certain very large API requests will time out. It is recommended to break up very large requests into a series of smaller requests.