Customer Data Platform 1.0.0

Working Draft

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Technical Committee:

OASIS Context Server (CXS) TC

Chair(s):

- Serge Huber (shuber@jahia.com), Jahia Solutions Group SA
- Thomas Lund Sigdestad (tsi@enonic.com), Enonic

Editor(s):

- Thomas Lund Sigdestad (tsi@enonic.com), Enonic
- Serge Huber (shuber@jahia.com), Jahia Solutions Group SA

Additional artifacts:

This prose specification is one component of a Work Product that also includes:

- GraphQL sample implementation: http://docs.oasis-open.org/tc-short-name/WP-abbrev/version/csdXX/schemas/ (hyperlink, including terminating /)
- Other parts (list full title and VISIBLE hyperlink, preferably to HTML version)

Related work:

This specification is related to:

- GraphQL : https://graphql.org
- GraphQL specification : https://facebook.github.io/graphql/
- Related specifications (VISIBLE hyperlink, preferably to HTML version)

Abstract:

This specification aims to standardize exchange of customer data across systems and silos by defining a web-based API using GraphQL, thus providing a self-documented and strongly typed

interface while allowing extensive customization. It is based upon four core concepts: Profiles, Events, Consents, and Clients.

Status:

This document was last revised or approved by the OASIS Context Server (CXS) TC on the above date. The level of approval is also listed above. Check the "Latest version" location noted above for possible later revisions of this document. Any other numbered Versions and other technical work produced by the Technical Committee (TC) are listed at https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=cxs#technical.

TC members should send comments on this specification to the TC's email list. Others should send comments to the TC's public comment list, after subscribing to it by following the instructions at the "Send A Comment" button on the TC's web page at https://www.oasis-open.org/committees/cxs/.

This specification is provided under the Non-Assertion Mode of the OASIS IPR Policy, the mode chosen when the Technical Committee was established. For information on whether any patents have been disclosed that may be essential to implementing this specification, and any offers of patent licensing terms, please refer to the Intellectual Property Rights section of the TC's web page (https://www.oasis-open.org/committees/cxs/ipr.php).

Note that any machine-readable content (Computer Language Definitions) declared Normative for this Work Product is provided in separate plain text files. In the event of a discrepancy between any such plain text file and display content in the Work Product's prose narrative document(s), the content in the separate plain text file prevails.

Citation format:

When referencing this specification the following citation format should be used:

CDP-v1.0

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Notices

1. Introduction

Today, virtually all business is at some point digital, and the number of systems involved and the set of data collected is growing rapidly. Each system creates new silos of customer data, spreading sensitive and personal data across both organizational and geographical borders.

Even digital savvy businesses struggle to control and utilize this information. Businesses and users also rely on such data to be accessible in real-time, and at scale - for instance to deliver personalizations. Additionally businesses now face severe legal charges if customer data is not treated according to regulatory requirements (ref GDPR).

The Customer Data Platform (CDP) specification aims to standardize exchange of customer data across systems and silos. This enables centralization of customer data - consequently giving control of the data back to the business, and the customers.

The CDP standard is defined as a web-based API using GraphQL - providing a self-documented and strongly typed interface.

It has been an explicit goal of the CXS committee to allow extensive customization of CDP deployments, in order to fit the need of each different organization. As such, the API dynamically evolves as you customize your deployment.

1.1. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119] and [RFC8174] when, and only when, they appear in all capitals, as shown here.

1.2. Normative References

```
\[RFC2119]  Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels",
BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-
editor.org/info/rfc2119>.
\[RFC8174]  Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words",
BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <http://www.rfc-
editor.org/info/rfc8174>.
\[Reference]    \[Full reference citation]
```

1.3. Non-Normative References

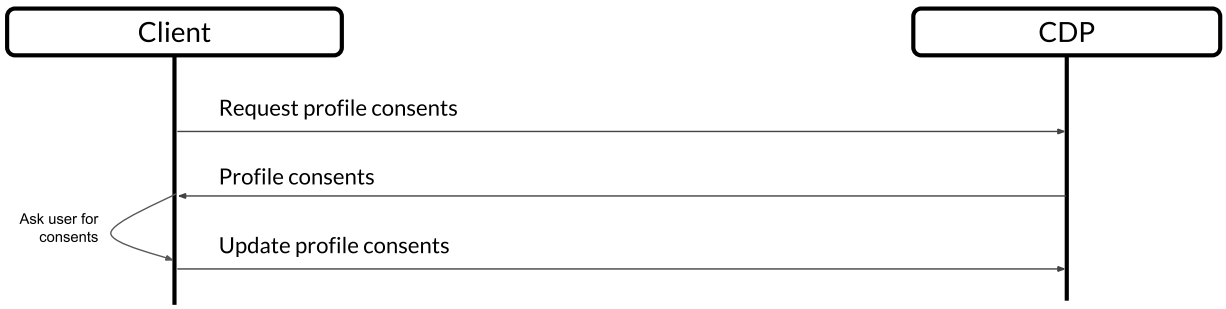
```
\[RFC3552]  Rescorla, E. and B. Korver, "Guidelines for Writing RFC Text on Security
Considerations", BCP 72, RFC 3552, DOI 10.17487/RFC3552, July 2003, <https://www.rfc-
editor.org/info/rfc3552>.
\[Reference]    \[Full reference citation]
```

2. Use Cases

In this section we present a few use cases that are relevant to the scope covered by the CDP specification. They are by no means exhaustive and serve primarly as illustrations of what may be achieved using servers that implement the standard.

2.1. Consent management

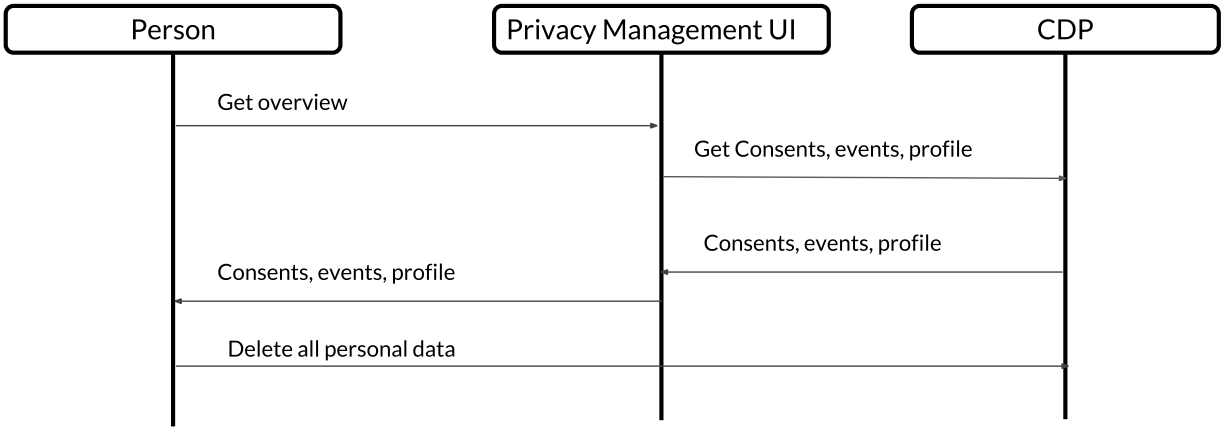
Privacy is a very important topic, especially when dealing with visitor data. For example, new legislation such as the GDPR imposes strict restrictions on how visitor data collection should be processed. It is therefore very important that the CDP specification provide standardized ways of complying with more and more stringent requirements.



In the above use case we illustrate the support of consent management that is available in CDP-compliant systems. A visitor profile may store the state of consents (granted or not) and these may be updated by using specialized event types.

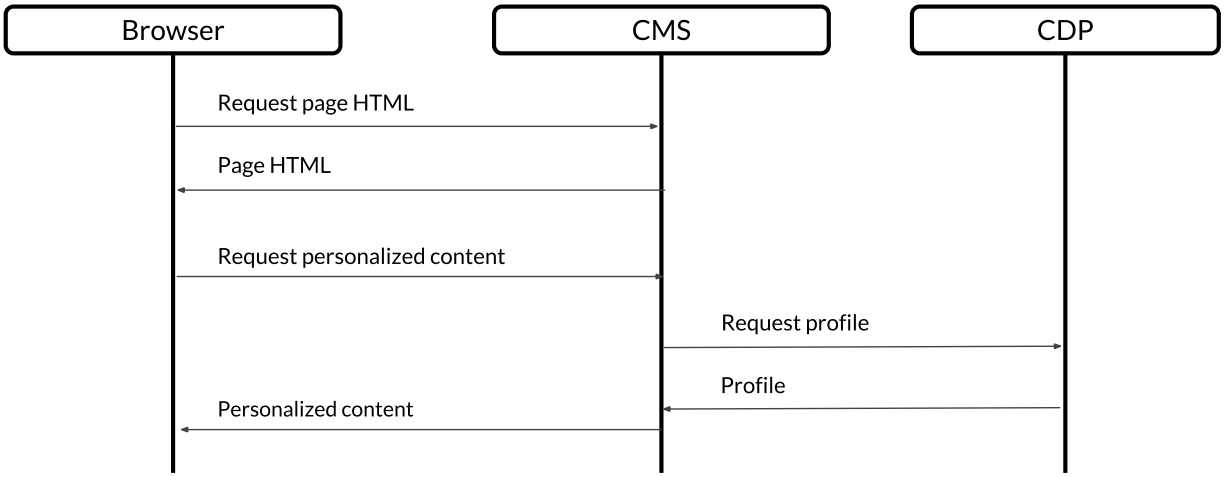
2.2. Privacy management

todo describe this use case.



2.3. Personalization

The first and most common use case is the case of delivering personalized experiences on (desktop or mobile) web sites.

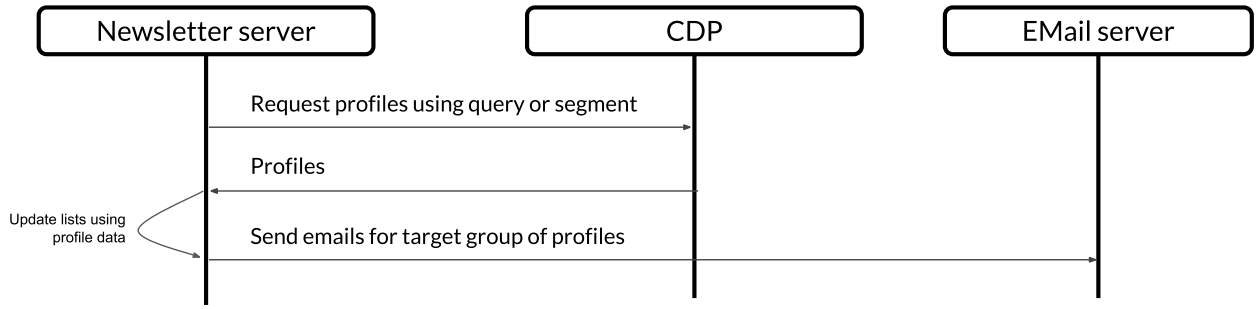


As illustrated above, the browser can interact with both a Content Management System (CMS) and a CDP-compliant server to first retrieve the HTML needed to deliver the page content. After this the next request to the CMS is a request for personalized content that will be customized based on the profile retrieved from the CDP. The result is personalized content for the current visitor being sent back to the browser.

This illustration is by no means the only way to implement personalization using a CDP but it serves as a simple introduction to the possibilies such a system may offer.

2.4. Newsletters

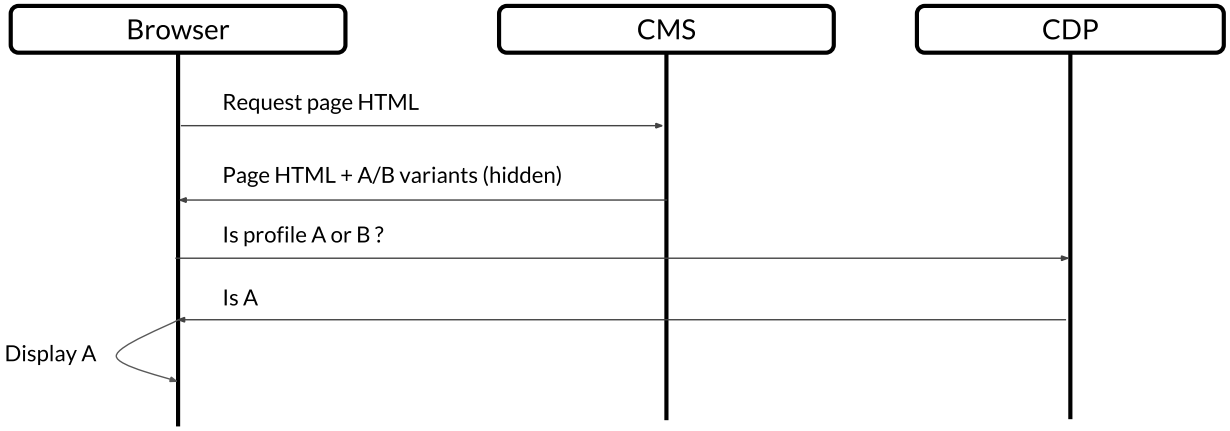
This use case is relevant to users interested in delivering newsletters to the proper audience. For example it might be interesting to send a newsletter to promote a product to a group of profiles that has not purchased the product before, but it would not be a good idea to send it to people that have already purchased it.



In the above illustration the newsletter server can query the CDP for a group of profile using either a query or a pre- defined segment to retrieve the subset of profiles it is interested in. Once those profiles are retrieved they may be used to update the newsletters management system lists with information coming from those exported profiles. And finally, when the newsletter is ready to be distributed, the updated lists may be used to send the emails using an email delivery server.

2.5. A/B testing

CDP systems may also be used to deliver A/B testing experiences. In this use case, the CDP server will use the visitor profile information by updating it with the variants that the visitor has been exposed to, effectively "classifying" the visitor into a sub-group.



In the above illustration, this use case is implemented by using a CMS to deliver the different variants of content that are hidden by default. After that, the CDP is asked whether the profile is in variant A or B, which might be implemented in different fashions but they will be remembered by the CDP for future displays.

3. Domain objects

Below is a short introduction to the core domain objects of the specification:

Events

Events represent the stream of "customer behaviour" events that help the CDP build Profiles

Profiles

Representing the data of the subject, or "customer" interacting with your business Objects

Personas

Create Personas to simulate real Profiles and test your ideas

Objects

Are the target items (and possibly persons) a "customer" interacts with

Lists

Manually or programatically updated Lists of profiles

Segments

Segments are dynamic lists based on Filters

Consents

Consents granted or denied by the subjects Properties: Allow the definition of custom profile

Properties within a CDP deployment

Clients

Clients represent any entity connecting to CDP, either for storing or retrieving data

Views

Create dministrative Views for grouping objects defined by back-office users

Interest

Represents a profiles weighted [Interest] in a specific [Topic]

Topics

Represent "business areas" of an organisation deploying CDP - like a product or a location.

Filters

Enable definition of structured queries against other CDP domain objects

4. API Reference

The Customer Data Platform (CDP) standard is built around a set of concepts, domain objects and services for interacting with them. This is represented through a strongly typed API defined through GraphQL Types, Queries, Mutations and Subscriptions.

Each section in the API reference will usually start with a description of the domain objects and then include the normative GraphQL types, queries and mutations relevant to the domain objects.

This chapter describes the API in detail.

GraphQL requests are usually composed of two parts : `operations` and `variables`.

Throughout this document we will provide GraphQL request examples in the following form:

operation

GraphQL query, mutation or subscription

variables

JSON structure

Example operation

```
query getExistingProfile($profileId : CDP_ProfileIDInput) {
  cdp {
    getProfile(createIfMissing: false, profileID: $profileId) {
      _profileIDs {
        id
      }
    }
  }
}
```

What the above query does is retrieve all the profileIDs for a existing profile (that's why we set the createIfMissing argument to false). We also define a variable called $profileId that must be passed in the "variables" section of the GraphQL request. Here's an example of the `variables part:

Example variables

```
{
  "profileId": {
    "clientId": "web-tracker",
    "id": "0bb99ae7-0571-4b5f-8267-978731cb62c2"
  }
}
```

As illustrated above, the variables may contain complex JSON structure that represent the values for the objects that are passed as GraphQL arguments.

NOTE	The most efficient way to explore the GraphQL API is by starting the sample CDP server TODO

4.1. Scalars

GraphQL provides several basic value types that are used extensively in this specification, for instance Int and String. However, the CDP specification is also handling other value types in a similar fashion. As such, the following scalars have been added:

4.1.1. JSON

For values and arguments that cannot be defined structurally

```
Scalar JSON
```

4.1.2. Date

For consistent representation of dates. Based on RFC-3339, for example 1996-12-19, see https://github.com/graphql-java/graphql-java-extended-scalars for example implementation

```
Scalar Date
```

4.1.3. Time

For consistent representation of time. Based on RFC-3339, for example 16:39:57-08:00, see https://github.com/graphql-java/graphql-java-extended-scalars for example implementation

```
Scalar Time
```

4.1.4. DateTime

For consistent representation of date and time. Based on RFC-3339, for example 1996-12-19T16:39:57-08:00, see https://github.com/graphql-java/graphql-java-extended-scalars for example implementation

```
Scalar DateTime
```

4.1.5. GeoPoint

Uses a string representation of lat,lon

```
Scalar GeoPoint
```

4.2. Properties

To properly store and query data CDP needs a way to describe the data dynamically.

A Property represents data stored in a key-value format. A single property can hold a single value, or an ordered array of values. Each property has a specific valueType to limit what kind of values it may hold. These are `Identifier`,`String`, `Int`, `Float`, `Date`, `Boolean`, `GeoPoint`, `Enumeration` and `Set`.

Below are some examples of properties:

- fullName(String) : "Jane Doe"
- birthDate(Date) : "2003-07-01"
- someInteger(Integer) : 1337
- gender(Enumeration) : FEMALE
- location(GeoPoint) : "lat,lon"
- arrayOfStrings([String]) : ["This", "is", "nice"]
- setOfProperties(Set) : {prompt : "hello", response : "yo"}

In the case of the enumeration value type, a GraphQL enum type will be generated based on the

registered possible values for the property.

The Set value type is special, as it enables nested properties and a tree-structure of properties. I.e. from the example above: "setOfProperties.response" would hold the value "yo"

A property consists of:

- the property name (it is RECOMMENDED but not mandatory to prefix the property name)
- the valueType of the property (Identifier, String, Int, Float, Date, Boolean, GeoPoint, Enumeration and Set)
- minimum occurrences of values (a property may hold one or more values)
- maximum occurrences

Since the CDP api is defined using strongly typed GraphQL, the API is dynamically updated when properties are added or changed.

4.2.1. CDP_Property

The property interface defines the common fields for the different value types.

```
interface CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
}
```

name

must be in a format that's acceptable as a GraphQL field name (/[*A-Za-z][_0-9A-Za-z]*/) , and we RECOMMEND to prefix it to avoid conflicts, i.e acme_pageView, acme_click. "cdp*" is reserved.

minOccurences

Default = 0. For minOccurrences > 1 the property can hold multiple values in preserved order. minOccurences = 1 indicates the property is mandatory.

maxOccurences

Default = 1. maxOccurences = 0 indicates no limit. maxOccurences must be higher than minOccurences.

tags

System defined/generated tags. E.g: hidden, readOnly, personalData

4.2.2. CDP_PropertyInput

This type is a workaround for missing inheritance in GraphQL. Only one field may be used at a time, all other fields must be null.

```
input CDP_PropertyInput {
  identifier : CDP_IdentifierPropertyInput
  string : CDP_StringPropertyInput
  int : CDP_IntPropertyInput
  float : CDP_FloatPropertyInput
  date : CDP_DatePropertyInput
  boolean : CDP_BooleanPropertyInput
  geopoint : CDP_GeoPointPropertyInput
  enum : CDP_EnumPropertyInput
  set : CDP_SetPropertyInput
}
```

4.2.3. CDP_BooleanProperty

```
type CDP_BooleanProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  defaultValue : Boolean
}
```

4.2.4. CDP_BooleanPropertyInput

```
input CDP_BooleanPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  defaultValue : Boolean
}
```

4.2.5. CDP_DateProperty

```
type CDP_DateProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  defaultValue : String
}
```

4.2.6. CDP_DatePropertyInput

```
input CDP_DatePropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  defaultValue : String
}
```

4.2.7. CDP_EnumProperty

```
type CDP_EnumProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  values : [String]
}
```

4.2.8. CDP_EnumPropertyInput

```
input CDP_EnumPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  values : [String]
}
```

4.2.9. CDP_FloatProperty

```
type CDP_FloatProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  minValue : Float
  maxValue : Float
  defaultValue : Float
}
```

4.2.10. CDP_FloatPropertyInput

```
input CDP_FloatPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  minValue : Float
  maxValue : Float
  defaultValue : Float
}
```

4.2.11. CDP_GeoPointProperty

```
type CDP_GeoPointProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  defaultValue : String
}
```

4.2.12. CDP_GeoPointPropertyInput

```
input CDP_GeoPointPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  defaultValue : String
}
```

4.2.13. CDP_IdentifierProperty

```
type CDP_IdentifierProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  regexp : String
  defaultValue : String
}
```

4.2.14. CDP_IdentifierPropertyInput

```
input CDP_IdentifierPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  regexp : String
  defaultValue : String
}
```

4.2.15. CDP_IntProperty

```
type CDP_IntProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  minValue : Int
  maxValue : Int
  defaultValue : Int
}
```

4.2.16. CDP_IntPropertyInput

```
input CDP_IntPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  minValue : Int
  maxValue : Int
  defaultValue : Int
}
```

4.2.17. CDP_StringProperty

```
type CDP_StringProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  regexp : String
  defaultValue : String
}
```

4.2.18. CDP_StringPropertyInput

```
input CDP_StringPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  regexp : String
  defaultValue : String
}
```

4.2.19. CDP_SetProperty

```
type CDP_SetProperty implements CDP_PropertyInterface {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  properties : [CDP_PropertyInterface]
}
```

4.2.20. CDP_SetPropertyInput

```
input CDP_SetPropertyInput {
  name : ID!
  minOccurrences : Int
  maxOccurrences : Int
  tags : [String]
  properties : [CDP_PropertyInput]
}
```

4.3. Filters

Filters are widely used in CDP, and enable querying profiles, events, and other CDP objects. Filters are designed to be easy to use for administrators and marketeers in visual user interfaces, but also in terms of technical implementation.

Filters are essentially composed from basic property comparison expressions, and may be chained with the operators AND and OR, where AND is used by default.

For each operator available on a property's value type a GraphQL field will be generated.

As we are expressing filters through GraphQL, filters will always be strongly typed. I.e. if the property "firstName" with valueType string is available, the following filter options can be used:

```
firstName_equals
firstName_startsWith (optional)
firstName_endsWith (optional)
firstName_contains
firstName_regexp (optional)
```

Below are some basic filter examples:

```
{ "firstName_equals" : "Serge" }
```

```
{ "birthDate_greaterThan" : "1970-01-01" }
```

```
{
  "location_distance" : {
    "center" : { "longitude" : 59.91273, "latitude": 10.74609 },
    "unit" : "KILOMETERS",
    "distance" : 5
  }
}
```

```
{
  "or" : [
    { "firstName_equals" : "Serge" },
    { "birthDate_greaterThan" : "1970-01-01" }
  ]
}
```

GraphQL filter fields will be generated the following way:

```
PROPERTYNAME + "_" + OPERATOR
```

The following comparison operators are available:

Table 1. Operator availability for property value types

Operators	Identifier	String	Int	Float	Date	Boolean	GeoPoint	Enumeration	Array
equals	x	x	x	x	x	x	x	x	
startsWith		x[o]							
endsWith		x[o]							

Operators	Identifier	String	Int	Float	Date	Boolean	GeoPoint	Enumeration	Array
contains		x[o]							x
regexp		x[o]							
lt			x	x	x				
lte			x	x	x				
gt			x	x	x				
gte			x	x	x				
distance							x		

[o] Optional operator

The `Array` column is a special case. It can be an array of any GraphQL type. In this case only the `contains` operator is defined in the specification, but implementations are free to offer more advanced operators for this type.

4.3.1. Ordering

OrderBy is used in combination with filters and lets you sort the result based on properties available for the returned objects.

Example:

```
"orderBy": [{
  "property": "firstName",
  "order": "ASC"
  }
]
```

4.3.2. CDP_SortOrder

Enumeration of allowed sorting operators

```
enum CDP_SortOrder {
  ASC,
  DESC,
  UNSPECIFIED
}
```

4.3.3. CDP_OrderByInput

```
input CDP_OrderByInput {
  fieldName : String
  order : CDP_SortOrder
}
```

fieldName

Specify the field to sort by, i.e. "endTime", "properties.location"

4.3.4. CDP_DateFilter

```
type CDP_DateFilter {
  after : DateTime
  before : DateTime
  includeAfter : Boolean
  includeBefore : Boolean
}
```

4.3.5. CDP_DateFilterInput

```
input CDP_DateFilterInput {
  after : DateTime
  before : DateTime
  includeAfter : Boolean
  includeBefore : Boolean
}
```

4.3.6. CDP_GeoDistanceFilterUnit

```
enum CDP_GeoDistanceFilterUnit {
  METERS,
  KILOMETERS,
  MILES
}
```

4.3.7. CDP_GeoDistanceFilter

```
type CDP_GeoDistanceFilter {
  center : GeoPoint
  unit : CDP_GeoDistanceFilterUnit
  distance : Float
}
```

4.3.8. CDP_GeoDistanceFilterInput

```
input CDP_GeoDistanceFilterInput {
  center : GeoPoint
  unit : CDP_GeoDistanceFilterUnit
  distance : Float
}
```

4.4. Clients

The CDP GraphQL API should only be accessible for specific authorized clients.

Client represent any software that interacts directly with the Customer Data Platform.

Examples of clients are:

- Cookie-based (Javascript or other) tracker for website(s)
- Integration with your CRM
- Integration with your Identity System

Each Client is responsible for uniquely identifying visitors, for instance through the use of a cookie on the website, a customer ID in the CRM or a user ID in the Identity system. The Customer Data Platform requires [profileIDs] to be unique within every client. For instance, if a client is used to track visitors across multiple websites, it should aim to re-use the same [profileID] across all of them, for the same visitor.

NOTE	The standard does not specify Queries or Mutations for creating or retrieving Clients in the CDP specification, as this is considered an implementation-specific feature. For any CDP implementation, a Client MUST be defined before it can access the API.

4.4.1. CDP_Client

```
type CDP_Client {
    id : ID!
    title : String
}
```

4.5. Sources

Sources are optional, but represent a way to identify the exact origin of events within a client. For instance, a web tracking script may track visitors across many different sites, but treat each site as a source. As such, sources are comparable to siteID's in Google Analytics.

Sources may be reused across clients as desired.

4.5.1. CDP_Source

```
type CDP_Source {
    id : ID!
    thirdParty : Boolean
}
```

4.5.2. CDP_SourceInput

```
input CDP_SourceInput {
    id : ID!
    thirdParty : Boolean
}
```

id

The "system" source ID is reserved for internal use by the CDP.

thirdParty

Optional, indicates that the source is a third party (useful for privacy regulations such as GDPR)

4.5.3. CDP_Query

Source related queries

```
  getSources : [CDP_Source]
```

4.5.4. CDP_Mutation

Source related mutations

```
  createOrUpdateSource(source : CDP_SourceInput) : CDP_Source
  deleteSource(sourceID : ID!) : Boolean
```

4.6. Objects

Objects are representations of anything users interact with. For example: a web page, a product or another person. Objects are used in Events to specify what the Profiles are interacting with. Objects are also used in Optimizations.

Objects may be part of one or more collections. Collections are used to classify objects. By placing objects into collections, optimizations may execute on a reduced data set (i.e. : recommending products).

4.6.1. URIs

Objects are identified globally using URIs, that follow the URI specification (https://tools.ietf.org/html/rfc3986). Internal CDP objects may be referenced using reserved schemes, that each have their associated syntax:

- cdp_profile:client/id
- cdp_segment:view/name
- cdp_persona:view/name
- cdp_topic:view/name
- cdp_list:view/name

4.6.2. CDP_Object

```
type CDP_Object {
    uri : ID! # uri format : scheme:path, https://tools.ietf.org/html/rfc3986
    scheme : String
    path : String
    topics : [CDP_Topic]
}
```

uri

Globally unique identifier using URI syntax : https://tools.ietf.org/html/rfc3986

topics

A way of classifying objects.

4.6.3. CDP_ObjectInput

```
input CDP_ObjectInput {
    uri : ID!
}
```

4.7. Events

Events are what drives the Customer Data Platform forward. Events are collected from different Clients, such as a specific website, beacons, commerce systems or a CRM.

A single Client might still produce many different profiles for a "real person". For instance - if a visitor uses different devices on a single web page, each device will produce a new profile, with a unique profileID.

The Customer Data Platform is essentially interested in "User behavioral events". An event could be anything from someone clicking a link, to performing a transaction or consenting to use of his/hers information. Events are streamed or delivered from authorized Clients to the Customer Data

Platform.

As an example: Imagine an e-commerce site with a client that collect events from its visitors. When a visitor browses the site with his laptop, the client assigns a cookie to his/her browser and starts feeding events to the CDP API. As the visitor click on some product links, and maybe fills in a form that includes e-mail. CDP will gradually populate a profile, using the cookie value as an ID. At a later point, the same visitor picks up a different device and returns to the site. As the client cannot know this is the same individual, a new cookie is generated, and a new profile starts to build up.

A single client may be used to track Events from a number of different websites, where each website can be tagged with a source. Sources provide a way to identify the exact origin of the events beyond the client. As such, sources are comparable to siteID's in Google Analytics.

4.7.1. EventTypes

Events must always be of a specific type. CDP implementations must implement a set of standard EventTypes, any other EventTypes are implementation specific.

For flexibility reasons, implementers are encouraged to make EventTypes pluggable. Implementation specific, or pluggable EventTypes SHOULD be registered with a prefix, to avoid naming conflicts. All standard EventTypes will be prefixed with CDP.

In the CDP, every EventType will need both an regular GraphQL type, and a GraphQL input.

NOTE	EventType fields MUST match the CDP propertyType format, and its underlying valueTypes

Below are examples of what custom EventTypes might look like:

Sample EventType for Page Views

```
input VENDOR_PageViewEvent {
  pageID : String,
  language : String,
  pageUrl : String,
  referrer : String,
  userAgent : String
}
```

Sample EventType for CRM updates

```
input VENDOR_crmLeadEvent {
  leadStatus : String,
  leadID : String,
  firstName : String,
  lastName : String,
  email : String
}
```

Standard event types:

- Updating profile properties, needs to match the profile properties definitions (built-in)
- Session start/paused/resumed/stopped (built-in)
- Updating consent (see http://ec.europa.eu/ipg/basics/legal/cookies/index_en.htm) (built-in)
- Opt-in / opt-out of a list (built-in)

Suggested event types:

- Transaction (generic)
- Like (“user likes a product”)
- Dislike (“visitor dislikes a comment”)
- Abuse, “user reports abuse on a page”
- Rate (score in percent) “user rates product 4 out of 5 stars”
- Vote
- Download (“user downloaded a digital product”)
- Register/Submission
- Login
- Logout
- RequestFriendship
- AcceptFriendship
- DenyFriendship
- Click
- View
- Contribute (comment, blog etc?)
- Conversion (purchase, download, signs up for a service

4.7.2. CDP_EventInterface

Events make use of type inheritance. To avoid name space conflicts, all standard event fields are prefixed with ´´_´´.

```
interface CDP_EventInterface {
  id: ID!
  _source : CDP_Source
  _client : CDP_Client
  _profileID: CDP_ProfileID!
  _profile : CDP_Profile!
  _object: CDP_Object!
  _location: GeoPoint
  _timestamp: DateTime
  _topics : [CDP_Topic]
}
```

4.7.3. CDP_EventInput

```
input CDP_EventInput {
  id: ID
  _sourceID : String
  _profileID: CDP_ProfileIDInput!
  _objectID: ID!
  _location: GeoPoint
  _timestamp: DateTime
  _topics : [ID]
  _profileUpdateEvent : CDP_ProfileUpdateEventInput
  _consentUpdateEvent : CDP_ConsentUpdateEventInput
  _listsUpdateEvent : CDP_ListsUpdateEventInput
  _sessionEvent : CDP_SessionEventInput
  # Sample custom EventTypes below:
  # my_pageView : MY_PageViewEventInput
  # my_addedToCart : MY_addedToCartEventInput,
  # other_crmUpdate : OTHER_crmUpdateEventInput
}
```

4.7.4. CDP_Query

Event queries

```
  getEvent(id : String!) : CDP_EventInterface
  findEvents(filter : CDP_EventFilterInput, orderBy : [CDP_OrderByInput], first: Int,
after: String, last: Int, before: String) : CDP_EventConnection
```

4.7.5. CDP_Mutation

Event mutations

```
  processEvents(events: [CDP_EventInput]!) : Int
```

4.7.6. CDP_Subscriptions

Event subscriptions

```
  eventListener(filter: CDP_EventFilterInput) : CDP_EventInterface!
```

4.7.7. Event processing sample

Mutation

```
mutation profileUpdateExample($events: [CDP_EventInput]!) {
  cdp {
    processEvents(events: $events)
  }
}
```

Mutation variables

```
{"events": [
  {
    "_profileID": {
      "id": "1234567890",
      "clientId": "web-tracker"
    },
    "_objectId": "http://acme.org/aboutUs",
    "pageViewEvent": {
      "language" : "en"
    }
  }
]}
```

4.8. EventFilters

EventFilters are a specific version of filters for querying events.

Example: Filter for identifying events of type `transaction` within the last 30 days.

Operation

```
query findEvents($filter: CDP_EventFilterInput) {
  cdp {
    findEvents(filter: $filter) {
      edges {
        node {
          __typename
        }
      }
    }
  }
}
```

Variables

```
{
  "filter" : {
    "_timestamp_between" : {
      "after" : "2018-06-28T05:25:28+00:00",
      "before" : "2018-06-28T06:25:28+00:00",
      "includeBefore": false,
      "includeAfter": false
    },
      "_profileUpdateEvent" : {
      "firstName_startsWith" : "T",
      "lastName_endsWith" : "d"
    }
  }
}
```

4.8.1. CDP_EventFilter

```
type CDP_EventFilter {
  and : [CDP_EventFilter]
  or : [CDP_EventFilter]
  id_equals : String
  _clientId_equals: String
  _sourceId_equals : String
  _profileId_equals : String
  _objectId_equals : String
  _location_distance : CDP_GeoDistanceFilter
  _timestamp_equals : DateTime
  _timestamp_lt : DateTime
  _timestamp_lte : DateTime
  _timestamp_gt : DateTime
  _timestamp_gte : DateTime
  _topics_equals : String
  _profileUpdateEvent : CDP_ProfileUpdateEventFilter
  _consentUpdateEvent : CDP_ConsentUpdateEventFilter
  _listsUpdateEvent : CDP_ListsUpdateEventFilter
  _sessionEvent : CDP_SessionEventFilter
  # generated event types will be listed here
}
```

4.8.2. CDP_EventFilterInput

```
input CDP_EventFilterInput {
  and : [CDP_EventFilterInput]
  or : [CDP_EventFilterInput]
  id_equals : String
  _clientId_equals: String
  _sourceId_equals : String
  _profileId_equals : String
  _objectId_equals : String
  _location_distance : CDP_GeoDistanceFilterInput
  _timestamp_equals : DateTime
  _timestamp_lt : DateTime
  _timestamp_lte : DateTime
  _timestamp_gt : DateTime
  _timestamp_gte : DateTime
  _profileUpdateEvent : CDP_ProfileUpdateEventFilterInput
  _consentUpdateEvent : CDP_ConsentUpdateEventFilterInput
  _listsUpdateEvent : CDP_ListsUpdateEventFilterInput
  _sessionEvent : CDP_SessionEventFilterInput
  # generated event types will be listed here
}
```

4.9. Profiles

Profiles are in many ways the holy grail of CDP. The Customer Data Platform dynamically creates and build profiles from events that occur over time.

A Profile can be created from an anonymous visitor on a webpage, populated from an identity system, a CRM, or the combination of all of them.

Different Clients like a website tracking script, CRM or identity system can be configured to feed Events to the Customer Data Platform.

The Customer Data Platform is responsible for building profiles based on the provided identifiers and the stream of events coming from each Client.

4.9.1. Profile properties

Each deployment of CDP will be unique in how data are collected, and what data is stored per profile. Profile properties enable us to define custom properties required by an organization.

Administrators and developers may define and maintain a consistent data model for profiles across different Clients. Any data to be recorded in a profile must be mapped to a corresponding profile property.

The specification does not define a set of standard profile properties. However, implementors SHOULD include the following standard properties :

- fullName : string
- email : identifier
- phoneNumber : identifier
- birthday : datetime # this can be very important for managing consents, or managing any approval for children, minors, etc...

Profiles are updated through events. The history of external or internal profile modifications is accessible through the profile update events. CDP implementations SHOULD also support subscriptions on profile modifications so that external systems can retrieve the profile modifications in real-time.

Properties can be dynamically defined for profiles using the `createOrUpdateProfileProperties` and `deleteProfileProperties` mutations. Once a property is associated with a profile, it will become available in the CDP_Profile and CDP_Persona types.

As an example, let's assume we have a starting CDP_Profile type that looks like this:

Profile before

```
type CDP_Profile implements CDP_ProfileInterface {
  _profileIDs : [CDP_ProfileID]
  _events(filter : CDP_EventFilterInput, first : Int, last: Int, after : String,
before: String) : CDP_EventConnection
  _lastEvents(count : Int, profileID : CDP_ProfileIDInput) : CDP_EventConnection
  _segments(views : [ID]) : [CDP_Segment]
  _interests(views : [ID]) : [CDP_Interest]
  _consents : [CDP_Consent]
  _lists(views : [ID]) : [CDP_List]
  _matches(namedFilters : [CDP_NamedFilterInput]) : [CDP_FilterMatch]
  _optimize(parameters : [CDP_OptimizationInput]) : [CDP_OptimizationResult]
  _recommend(parameters : [CDP_RecommendationInput]) : [CDP_RecommendationResult]
  # fields will be added here according to registered profile properties
}
```

Now let's use the mutation to create a new property.

Operation

```
mutation addProperties($properties: [CDP_PropertyInput]) {
  cdp {
    createOrUpdateProfileProperties(properties: $properties)
  }
}
```

Variables

```
{
  "properties": [
    {
      "string": {
        "name": "firstName"
      }
    },
    {
      "set": {
        "name": "sample_Address",
        "properties": {
          "string": {"name": "streetName"},
          "string": {"name": "postalCode"}
        }
      }
    }
  ]
}
```

This will resulting in the following modifications to the CDP_Profile type:

Profile after

```
type CDP_Profile implements CDP_ProfileInterface {
  _profileIDs : [CDP_ProfileID]
  _events(filter : CDP_EventFilterInput, first : Int, last: Int, after : String,
before: String) : CDP_EventConnection
  _lastEvents(count : Int, profileID : CDP_ProfileIDInput) : CDP_EventConnection
  _segments(views : [ID]) : [CDP_Segment]
  _interests(views : [ID]) : [CDP_Interest]
  _consents : [CDP_Consent]
  _lists(views : [ID]) : [CDP_List]
  _matches(namedFilters : [CDP_NamedFilterInput]) : [CDP_FilterMatch]
  _optimize(parameters : [CDP_OptimizationInput]) : [CDP_OptimizationResult]
  _recommend(parameters : [CDP_RecommendationInput]) : [CDP_RecommendationResult]
  # fields will be added here according to registered profile properties
  firstName : String
  sample_Address : Sample_Address
}
```

The following type is generated from the property definition. The name of the type starts with an uppercased character from the property name.

Generated type

```
type Sample_Address {
  streetName : String,
  postalCode : String
}
```

This will also generate new filter fields in the CDP_ProfilePropertiesFilterInput type:

Updated filters

```
type CDP_ProfilePropertiesFilter {
  and : [CDP_ProfilePropertiesFilter]
  or : [CDP_ProfilePropertiesFilter]
  # generated profile properties filters will be listed below
  firstName_equals : String,
  firstName_contains : String
  sample_Address : Sample_AddressFilter
}

type Sample_AddressFilter {
  streetName_equals : String,
  streetName_contains : String,
  postalCode_equals : String,
  streetName_contains : String
}

input CDP_ProfilePropertiesFilterInput {
  and : [CDP_ProfilePropertiesFilterInput]
  or : CDP_ProfilePropertiesFilterInput
  # generated profile properties filters will be listed below
  firstName_equals : String,
  firstName_contains : String
  sample_Address : Sample_AddressFilterInput
}

input Sample_AddressFilterInput {
  streetName_equals : String,
  streetName_contains : String,
  postalCode_equals : String,
  streetName_contains : String
}
```

As you can see the generation system also creates filter types (input and output) and adds the "Filter" and "FilterInput" suffix to them. This will always happen and implementations MUST do this.

Also not illustrated here, the same generation system will also add fields to the following types :

- CDP_ProfileUpdateEvent
- CDP_ProfileUpdateEventInput
- CDP_ProfileUpdateEventFilter
- CDP_ProfileUpdateEventFilterInput
- CDP_Persona
- CDP_PersonaInput

The naming and generation conventions are exactly the same as for the profiles properties.

4.9.2. Profile merges

Customer Data Platforms implementations SHOULD support profile merges.

As profiles evolve over time, the Customer Data Platform may discover that two profiles actually represent the same individual i.e. if the same e-mail address is registered in both profiles, or if the user in on both his devices. This may then result in a profile merge. During a profile merge, the Customer Data Platform will link two (or more) separate profiles together. In order to keep event history and avoid re-processing of data, the merge process must not affect the existing and unique profileIDs. This is why profiles are defined to have multiple profileIDs.

Example: As such, when visitors on a website are tracked through a cookie (defining the profileID), the cookie will remain the same even if the profile is merged.

Profile merges are optional in the CDP specification. They may be supported by using a property defined as an identifier as a merge key (multiple merge keys may of course exist) to merge multiple profiles. The resulting merged profile MUST contain all the source profile IDs of the merged profiles as well as the merged profile data. The original profiles that were merged may be flagged or deleted, this is implementation specific.

4.9.3. CDP_ProfileID

Profiles are created from a client. As such, each profile has a composite key based on a unique ID within that client, and the client.

```
type CDP_ProfileID {
    client : CDP_Client!
    id : ID!
    uri : ID # "cdp_profile:source/id"
}
```

4.9.4. CDP_ProfileIDInput

```
input CDP_ProfileIDInput {
    clientID : ID!
    id : ID!
}
```

- **id** ID must be unique within the client

4.9.5. CDP_ProfileInterface

Common interface for Profiles and Personas

```
interface CDP_ProfileInterface {
  _profileIDs : [CDP_ProfileID]
  _segments(views : [ID]) : [CDP_Segment]
  _interests(views : [ID]) : [CDP_Interest]
  _consents : [CDP_Consent]
  _lists(views : [ID]) : [CDP_List]
}
```

profileIDs

A single profile may consist of multiple id's as profiles are being merged. The CDP may also generate a system profile ID and expose it here

4.9.6. CDP_Profile

```
type CDP_Profile implements CDP_ProfileInterface {
  _profileIDs : [CDP_ProfileID]
  _events(filter : CDP_EventFilterInput, first : Int, last: Int, after : String,
before: String) : CDP_EventConnection
  _lastEvents(count : Int, profileID : CDP_ProfileIDInput) : CDP_EventConnection
  _segments(views : [ID]) : [CDP_Segment]
  _interests(views : [ID]) : [CDP_Interest]
  _consents : [CDP_Consent]
  _lists(views : [ID]) : [CDP_List]
  _matches(namedFilters : [CDP_NamedFilterInput]) : [CDP_FilterMatch]
  _optimize(parameters : [CDP_OptimizationInput]) : [CDP_OptimizationResult]
  _recommend(parameters : [CDP_RecommendationInput]) : [CDP_RecommendationResult]
  # fields will be added here according to registered profile properties
}
```

4.9.7. CDP_ProfileUpdateEvent

Profiles are crated and updated through this event type. This event is part of the standard and must be available for any implementation of the specification.

```
type CDP_ProfileUpdateEvent implements CDP_EventInterface {
  id: ID!
  _source : CDP_Source
  _client : CDP_Client
  _profileID: CDP_ProfileID!
  _profile : CDP_Profile!
  _object: CDP_Object!
  _location: GeoPoint
  _timestamp: DateTime
  _topics : [CDP_Topic]
  # fields will be added here according to registered profile properties. To remove a
property value pass a null value
}
```

4.9.8. CDP_ProfileUpdateEventInput

This is the input equivalent, notice because of missing input type inheritance in GraphQL, it only contains the actual properties to update.

Operation

```
mutation updateProfile($events: [CDP_EventInput]!) {
  cdp {
    processEvents(events: $events)
  }
}
```

Variables

```
{"events": [
  {
    "_object" : "cdp_profile:crm/crm-profile-id",
    "_profileID": {
      "source": "crm",
      "id": "crm-profile-id"
    },
    "_profileUpdateEvent": {
      "firstName" : "Serge",
      "sample_Address" : {
        "streetName" : "My street name",
        "postalCode" : "12345"
      }
    }
  }
]}
```

4.9.9. CDP_ProfileUpdateEventFilter

Sample ProfileUpdateEventFilter

```
input CDP_ProfileUpdateEventInput {
  firstname : String
  dateofbirth : Date
  # more fields will be available based on defined profile properties
}
```

4.9.10. CDP_ProfileUpdateEventFilterInput

Sample ProfileUpdateEventFilterInput

```
input CDP_ProfileUpdateEventInput {
  firstname : String
  dateofbirth : Date
  # more fields will be available based on defined profile properties
}
```

4.9.11. CDP_Query

Profile queries

```
  getProfile(profileID : CDP_ProfileIDInput, createIfMissing: Boolean) : CDP_Profile
  findProfiles(filter: CDP_ProfileFilterInput, orderBy: [CDP_OrderByInput], first:
Int, after: String, last: Int, before: String) : CDP_ProfileConnection
  getProfileProperties : CDP_PropertyConnection
```

4.9.12. CDP_Mutation

Profile mutations

```
  createOrUpdateProfileProperties(properties : [CDP_PropertyInput]) : Boolean
  deleteProfileProperties(propertyNames : [ID]!) : Boolean
  deleteProfile(profileID : CDP_ProfileIDInput) : CDP_Profile
```

4.9.13. CDP_Subscription

Profile subscriptions

```
  profileListener(filter: CDP_ProfileFilterInput) : CDP_Profile
```

4.10. ProfileFilters

Profile Filters are slightly more complex than EventFilters. As profileFilter are composed from both

searching profile properties, and events related to the profile.

Here is an example of a GraphQL query (with variables) that will retrieve profiles that "have joined the list with the id NEWSLETTER-LIST-ID since June 28th, 2018 at 5:25"

Operation

```
query profileFilterExample(
  $profileFilter: CDP_ProfileFilterInput
  $orderBy: [CDP_OrderByInput]
) {
  cdp {
    findProfiles(filter: $profileFilter, orderBy: $orderBy, first : 10) {
      totalCount
      edges {
        node {
          _profileIDs {
            source {
              id
            }
            id
          }
          _segments {
            name
          }
        }
      }
    }
  }
}
```

Variables

```
{
  "profileFilter": {
    "lists_contains" : [ "NEWSLETTER-LIST-ID" ],
    "properties": {},
    "events": {
      "minimalCount": 1,
      "eventFilter": {
        "_timestamp_gt": "2018-06-28T05:25:28+00:00",
        "_listsUpdateEvent": {
          "joinLists_contains" : ["NEWSLETTER-LIST-ID"]
        }
      }
    }
  },
  "orderBy": [
    {"fieldName": "properties.firstName", "order": "ASC"}
  ]
}
```

4.10.1. CDP_ProfileFilter

```
type CDP_ProfileFilter {
  profileIDs : [String]
  properties : CDP_ProfilePropertiesFilter
  segments_contains : [ID]
  consents_contains : [ID]
  lists_contains : [ID]
  interests : CDP_InterestFilter
  events : CDP_ProfileEventsFilter
}
```

4.10.2. CDP_ProfileFilterInput

```
input CDP_ProfileFilterInput {
  profileIDs_contains : [String]
  properties : CDP_ProfilePropertiesFilterInput
  segments_contains : [ID]
  consents_contains : [ID]
  lists_contains: [ID]
  interests : CDP_InterestFilterInput
  events : CDP_ProfileEventsFilterInput
}
```

4.10.3. CDP_ProfilePropertiesFilter

```
type CDP_ProfilePropertiesFilter {
  and : [CDP_ProfilePropertiesFilter]
  or : [CDP_ProfilePropertiesFilter]
  # generated profile properties filters will be listed below
}
```

4.10.4. CDP_ProfilePropertiesFilterInput

```
input CDP_ProfilePropertiesFilterInput {
  and : [CDP_ProfilePropertiesFilterInput]
  or : CDP_ProfilePropertiesFilterInput
  # generated profile properties filters will be listed below
}
```

4.10.5. CDP_ProfileEventsFilter

```
type CDP_ProfileEventsFilter {
  and : [CDP_ProfileEventsFilter]
  or : [CDP_ProfileEventsFilter]
  not : CDP_ProfileEventsFilter
  minimalCount : Int,
  maximalCount : Int,
  eventFilter : CDP_EventFilter
}
```

4.10.6. CDP_ProfileEventsFilterInput

```
input CDP_ProfileEventsFilterInput {
  and : [CDP_ProfileEventsFilterInput]
  or : [CDP_ProfileEventsFilterInput]
  not : CDP_ProfileEventsFilterInput
  minimalCount : Int,
  maximalCount : Int,
  eventFilter : CDP_EventFilterInput
}
```

4.11. Sessions

When individuals interact, clients may enrich the data associated with interaction by specifying sessions. For instance, a session may start when a user loads a specific app, and end when he closes it.

The CDP_SessionEventInput is used to signify the beginning, pause, resume or end of a session.

4.11.1. CDP_SessionState

```
enum CDP_SessionState {
  START,
  STOP,
  PAUSE,
  RESUME
}
```

4.11.2. CDP_SessionEvent

```
type CDP_SessionEvent implements CDP_EventInterface {
  id: ID!
  _source : CDP_Source
  _client : CDP_Client
  _profileID: CDP_ProfileID!
  _profile : CDP_Profile!
  _object: CDP_Object!
  _location: GeoPoint
  _timestamp: DateTime
  _topics : [CDP_Topic]
  state : CDP_SessionState
}
```

4.11.3. CDP_SessionEventInput

```
input CDP_SessionEventInput {
  state : CDP_SessionState
}
```

Example of how to update a session's state

Operation

```
mutation updateSessions($events: [CDP_EventInput]!) {
  cdp {
    processEvents(events: $events)
  }
}
```

Variables

```
{
  "events": [
    {
      "_profileID": {
        "source": "crm",
        "id" : "crm-profile-id"
      },
      "_object": "cdp_profile:crm/crm-profile-id",
      "_sessionEvent": {
        "state": "PAUSE"
      }
    }
  ]
}
```

4.12. Consents

New legislation and stricter rules for use of personal data is already here (i.e. GDPR). As such, consents are inherently more important to ensure you are using and storing data in compliance with policies.

Consents hold an identifier that uniquely identifies the consent across your systems.

Consents are given and revoked through events. This means that the CDP specification defines reserved property types for granting and revoking consents.

Sample ALLOW consent

```
{
  sourceId : "example.com",
  type: {name:"send-to-salesforce"},
  grant: ALLOW
  grantDate : 3498734899
  # no revoke date means it will not expire or defaults to system or legal standard
(GDPR)
}
```

Sample DENY consent

```
{
  sourceId : "example.com",
  type : {name:"newsletter-subscription-latestNews"},
  grant: DENY
  grantDate : 3498734899
  # no revoke date means it will not expire or defaults to system or legal standard
(GDPR)
}
```

Consent Types may include: - tracking - list membership - newsletter membership - access to camera - access to friends / contacts data - access to medical records - send sms - call you - send personal data to third parties - send anonymous data to third parties

Consent types are not defined in the specification, only the format of the type identifier should use a URI convention. Some URIs could actually be URLs and point to real resource that would give the semantics of the consent type. Types are not globally unique, a combination of view and types are globally unique and context server implementations may use "global" or "system" views to share types.

It is not in the scope of this specification to define how authentication and consents interact but it is expect that CDP implementations secure consent modifications. Also, tracking consents processing is not specified but it is highly recommended that implementations provide some mechanism to ease the pain of implementing tracking management with minimal end-user disturbance.

4.12.1. CDP_ConsentStatus

Uniquely specifies the status of any given Consent

```
enum CDP_ConsentStatus {
    GRANTED,
    DENIED,
    REVOKED
}
```

4.12.2. CDP_Consent

CDP_Consent represents a persisted Consent, always attached to a specific profile.

```
type CDP_Consent {
  token : ID!
  source : CDP_Source
  client : CDP_Client
  type : String!
  status : CDP_ConsentStatus!
  lastUpdate : DateTime
  expiration : DateTime
  profile : CDP_ProfileInterface
  events : CDP_EventConnection
}
```

Token

Similar to OAuth 2 authorization tokens to access the consent without the profile, also useful to delete the consent

Type

Should be a Url or other meaningful identifier like `//mycompany.com/consents/newsletters/weekly`, `//crmcompany.com/consents/push-to-crm` or `//oasis_open.org/cxs/consents/send-to-third-parties`

4.12.3. CDP_ConsentUpdateEvent

Standard EventType to create or update Consents.

```
type CDP_ConsentUpdateEvent implements CDP_EventInterface {
  id: ID!
  _source : CDP_Source
  _client : CDP_Client
  _profileID: CDP_ProfileID!
  _profile : CDP_Profile!
  _object: CDP_Object!
  _location: GeoPoint
  _timestamp: DateTime
  _topics : [CDP_Topic]
  type : String!
  status : String,
  lastUpdate : DateTime,
  expiration : DateTime
}
```

4.12.4. CDP_ConsentUpdateEventInput

Input type for ConsentUpdateEvent

```
input CDP_ConsentUpdateEventInput {
  type : String!
  status : String,
  lastUpdate : DateTime,
  expiration : DateTime
}
```

Example of how to update a consent for a profile :

Operation

```
mutation updateConsent($events: [CDP_EventInput]!) {
  cdp {
    processEvents(events: $events)
  }
}
```

Variables

```
{
  "events": [
    {
      "_profileID": {
        "source": "crm",
        "id" : "crm-profile-id"
      },
      "_object": "cdp_profile:crm/crm-profile-id",
      "_consentUpdateEvent": {
        "type": "newsletter",
        "status": "GRANTED",
        "lastUpdate": "now",
        "expiration": "now+365d"
      }
    }
  ]
}
```

4.12.5. CDP_ConsentUpdateEventFilter

Filter for ConsentUpdateEvents

```
type CDP_ConsentUpdateEventFilter {
  type_equals : String,
  status_equals : String,
  lastUpdate_equals : DateTime,
  lastUpdate_lt : DateTime,
  lastUpdate_lte : DateTime,
  lastUpdate_gt : DateTime,
  lastUpdate_gte : DateTime,
  expiration_equals : DateTime,
  expiration_lt : DateTime,
  expiration_lte : DateTime,
  expiration_gt : DateTime,
  expiration_gte : DateTime
}
```

4.12.6. CDP_ConsentUpdateEventFilterInput

Input type for of ConsentUpdateEventsFilter

```
input CDP_ConsentUpdateEventFilterInput {
  type_equals : String,
  status_equals : String
  lastUpdate_equals : DateTime,
  lastUpdate_lt : DateTime,
  lastUpdate_lte : DateTime,
  lastUpdate_gt : DateTime,
  lastUpdate_gte : DateTime,
  expiration_equals : DateTime,
  expiration_lt : DateTime,
  expiration_lte : DateTime,
  expiration_gt : DateTime,
  expiration_gte : DateTime
}
```

4.13. Views

Views provide a way of grouping administrative objects in the Customer Data Platform. Profiles, Events and Consents are all collected and stored globally, but other items are typically handled by administrators or marketeers, and benefit from being grouped into different views to simplify handling.

Lists, Segments, Topics and Personas are all tagged with Views.

4.13.1. CDP_View

```
type CDP_View {
  name: ID!
}
```

4.13.2. CDP_ViewInput

```
input CDP_ViewInput {
  name: ID!
}
```

4.13.3. CDP_Query

View queries

```
  getViews : [CDP_View]
```

4.13.4. CDP_Mutation

View mutations

```
  createOrUpdateView(view: CDP_ViewInput) : CDP_View
  deleteView(viewID : ID!) : Boolean
```

4.14. Topics

Topics represent the core entities of the business that is using the Customer Data Platform. The Customer Data Platform aims to find correlation between profiles and the topics. When such correlations are identified, it is called Interests.

CDP Administrators need to maintain a list of topics in order to obtain profile interests. Profile interests is typically a core objective of Marketing activities, and targeting users with better content.

Example Topics for a car manufacturer might for instance be:

- "Model S"
- "Model 3"
- "Model X"

Topics are associated with Objects and Profiles through Events. An example of how this might work in real life: A website promoting a specific Product, for instance "Car type X", should also contain meta-data for the associated topic i.e. "model X". The web tracking script can then feed this information back to the CDP, including both the object (web page in this case), and the specific topic. This way, the CDP will be able to build a model of association.

4.14.1. CDP_Topic

```
type CDP_Topic {
  id : ID!
  view : CDP_View!
  name: String!
}
```

4.14.2. CDP_TopicInput

```
input CDP_TopicInput {
  id : ID
  view : ID!
  name: String!
}
```

4.14.3. CDP_TopicFilterInput

```
input CDP_TopicFilterInput {
  and : [CDP_TopicFilterInput]
  or : [CDP_TopicFilterInput]
  view_equals : ID
  id_equals : String
  name_equals : String
}
```

4.14.4. CDP_Query

Topic queries

```
  getTopic(topicID : ID) : CDP_Topic
  findTopics(filter: CDP_TopicFilterInput, orderBy: [CDP_OrderByInput], first: Int,
after: String, last: Int, before: String) : CDP_TopicConnection
```

4.14.5. CDP_Mutation

Topic mutations

```
  createOrUpdateTopic(topic : CDP_TopicInput) : CDP_Topic
  deleteTopic(topicID : String) : CDP_Topic
```

4.15. Interests

An important use-case for the Customer Data Platform is to determine a profile's "Interests".

Whenever the Customer Data Platform registers an events that are associated with one or more Topics, this will affect the profile's interest for the specific Topic. A profile's interest for a specific topic is measured between 0-1, where 1 is maximum. As such 0,5 would indicate a higher interest than 0,35.

The algorithm for how a Customer Data Platform scores and interest is implementation specific - but implementations should also take care of automatically decreasing interest over time, unless new and relevant events occur.

Example interests for products from a car manufacturer might be:

- Model S = 0.1
- Model 3 = 0.3
- Model X = 0.9
- Model Y = 1.0

4.15.1. CDP_Interest

Interests are calculated automatically based on implementation specific algorithm

```
type CDP_Interest {
  topic: CDP_Topic!
  score : Float
}
```

score

will be between 0.0 to 1.0

4.15.2. CDP_InterestInput

Specifying interest is only relevant for Personas

```
input CDP_InterestInput {
  topic : ID!
  score : Float
}
```

4.16. Personas

A persona is a concept used to personify your audience. This may for instance be used to test personalization and targeting of content in a 3rd party system.

In CDP, personas are essentially "dummy" profiles with the primary purpose of testing or emulating a real profile. A common use-case would be testing personalized content in a CMS or a newsletter.

Personas and their fields can be explicitly created, where real profiles are built from a stream of

events.

Here's an example of creating a persona :

Operation

```
mutation updatePersona($persona: CDP_PersonaInput) {
  cdp {
    createOrUpdatePersona(persona: $persona) {
      id
    }
  }
}
```

Variables

```
{
  "persona": {
    "_name": "mikeMarketing",
    "_view": "acme",
    "_segments": ["segment1", "segment2"],
    "_consents": [ {
      "type": "newsletter",
      "status": "GRANTED",
      "lastUpdate": "NOW",
      "expiration" : "NOW+30DAYS"
    } ],
    "_interests": [{"topic": "topic1", "score": 10}]
    "firstName" : "Mike",
    "lastName" : "Marketing"
  }
}
```

4.16.1. CDP_Persona

```
type CDP_Persona implements CDP_ProfileInterface {
  id : ID!
  _name : String!
  _view : CDP_View!
  _profileIDs : [CDP_ProfileID]
  _segments(views : [ID]) : [CDP_Segment]
  _interests(views : [ID]) : [CDP_Interest]
  _consents : [CDP_Consent]
  _lists(views : [ID]) : [CDP_List]
  # fields will be added here according to registered profile properties
}
```

4.16.2. CDP_PersonaInput

```
input CDP_PersonaInput {
  id : ID
  _name : String!
  _view : ID!
  _profileIDs : [CDP_ProfileIDInput]
  _segments : [ID]
  _interests : [CDP_InterestInput]
  _consents : [CDP_PersonaConsentInput]
  # fields will be added here according to registered profile properties
}
```

4.16.3. CDP_PersonaConsentInput

Special type to set PersonaConsent without the use of events

```
input CDP_PersonaConsentInput {
  type : String!
  status : String,
  lastUpdate : DateTime,
  expiration : DateTime
}
```

4.16.4. CDP_Query

Persona queries

```
  getPersona(personaID : String) : CDP_Persona
  findPersonas(filter: CDP_ProfileFilterInput, orderBy: [CDP_OrderByInput], first:
Int, after: String, last: Int, before: String) : CDP_ProfileConnection
```

4.16.5. CDP_Mutation

Persona mutations

```
  createOrUpdatePersona(persona : CDP_PersonaInput) : CDP_Persona
  deletePersona(personaID : String) : CDP_Persona
```

4.17. Lists

Lists are explicitly created and named in the Customer Data Platform. Profiles may then be added to a list, and later opt out if desired. Whenever a profile opts out of a list, that information will also be stored. This prevents the profile from accidentally being added back to the list at a later point.

A common use-case for lists is creating a list for a campaign, and add the target profiles to the list as

the campaign starts.

4.17.1. CDP_List

```
type CDP_List {
  id : ID!
  view: CDP_View!
  name : String!
  active(first: Int, after: String, last: Int, before: String) : CDP_ProfileConnection
  inactive(first: Int, after: String, last: Int, before: String) :
CDP_ProfileConnection
}
```

id

Cannot change and is usually server generated

4.17.2. CDP_ListInput

```
input CDP_ListInput {
  id : ID
  view: ID!
  name : String!
}
```

4.17.3. CDP_ListsUpdateEvent

Standard Event to update profile membership for specified lists

```
type CDP_ListsUpdateEvent implements CDP_EventInterface {
  id: ID!
  _source : CDP_Source
  _client : CDP_Client
  _profileID: CDP_ProfileID!
  _profile : CDP_Profile!
  _object: CDP_Object!
  _location: GeoPoint
  _timestamp: DateTime
  _topics : [CDP_Topic]
  joinLists : [CDP_List]
  leaveLists : [CDP_List]
}
```

4.17.4. CDP_ListsUpdateEventInput

```
input CDP_ListsUpdateEventInput {
  joinLists : [ID]
  leaveLists : [ID]
}
```

Example of how to update lists for a profile :

Operation

```
mutation updateLists($events: [CDP_EventInput]!) {
  cdp {
    processEvents(events: $events)
  }
}
```

Variables

```
{
  "events": [
    {
      "_profileID": {
        "source": "crm",
        "id" : "crm-profile-id"
      },
      "_object": "cdp_profile:crm/crm-profile-id",
      "_listsUpdateEvent": {
        "joinLists": ["list1", "list2"],
        "leaveLists": ["list3", "list4"]
      }
    }
  ]
}
```

4.17.5. CDP_ListsUpdateEventFilter

```
type CDP_ListsUpdateEventFilter {
  joinLists_contains : [ID]
  leaveLists_contains : [ID]
}
```

4.17.6. CDP_ListsUpdateEventFilterInput

```
input CDP_ListsUpdateEventFilterInput {
  joinLists_contains : [ID]
  leaveLists_contains : [ID]
}
```

4.17.7. CDP_ListsFilterInput

```
input CDP_ListFilterInput {
  and : [CDP_ListFilterInput]
  or : [CDP_ListFilterInput]
  view_equals : ID
  name_equals : String
}
```

4.17.8. CDP_Query

List queries

```
  getList(listID : ID) : CDP_List
  findLists(filter: CDP_ListFilterInput, orderBy: [CDP_OrderByInput], first: Int,
after: String, last: Int, before: String) : CDP_ListConnection
```

4.17.9. CDP_Mutation

List mutations

```
  createOrUpdateList(list : CDP_ListInput) : CDP_List
  addProfileToList(listID : ID, profileID : CDP_ProfileIDInput, active : Boolean) :
CDP_List
  removeProfileFromList(listID : ID, profileID : CDP_ProfileIDInput) : CDP_List
  deleteList(listID : ID) : CDP_List
```

4.18. Segments

Segments are similar to lists in that profiles may be in the segment, or not. However, where profiles are explicitly added to lists, they are dynamically resolved to segments based on the filter defined in the segment.

Administrative users define segments through Filters.

Example segments:

- **Rich europeans**: Profiles in Europe with income above €100k
- **Frequent buyer**: Profiles that have completed more than 5 transactions in the last 3 months

Here’s an example operation to create a "male" segment (it assumes a "gender" profile property has been defined).

operation

```
mutation createSegment($segment: CDP_SegmentInput) {
  cdp {
    createOrUpdateSegment(segment: $segment) {
      name
    }
  }
}
```

variables

```
{
  "segment": {
    "name": "males",
    "view": "acme",
    "profiles": {
      "properties": {
        "gender_equals" : "male"
      }
    }
  }
}
```

4.18.1. CDP_Segment

```
type CDP_Segment {
  id : ID!
  view: CDP_View!
  name : String!
  profiles : CDP_ProfileFilter
}
```

4.18.2. CDP_SegmentInput

```
input CDP_SegmentInput {
  id : ID
  view : ID!
  name : String
  profiles : CDP_ProfileFilterInput
}
```

4.18.3. CDP_SegmentFilterInput

```
input CDP_SegmentFilterInput {
  and : [CDP_SegmentFilterInput]
  or : [CDP_SegmentFilterInput]
  view_equals : ID
  name_equals : String
}
```

4.18.4. CDP_Query

Segment queries

```
  getSegment(segmentID : ID) : CDP_Segment
  findSegments(filter: CDP_SegmentFilterInput, orderBy: [CDP_OrderByInput], first:
Int, after: String, last: Int, before: String) : CDP_SegmentConnection
```

4.18.5. CDP_Mutation

Segment mutations

```
  createOrUpdateSegment(segment : CDP_SegmentInput) : CDP_Segment
  deleteSegment(segmentID : String) : CDP_Segment
```

4.19. Profile matching

Clients may want to identify in real time if a given profile matches a specific segment, or filter. This can effectively used in order to produce personalized responses or messages.

4.19.1. CDP_NamedFilterInput

Named filters are used to evaluate filters against a profile - useful for building personalized experiences

```
input CDP_NamedFilterInput {
  name : String!
  filter: CDP_ProfileFilterInput
}
```

4.19.2. CDP_FilterMatch

The result of a named filter match request

```
type CDP_FilterMatch {
  name : String
  matched : Boolean
  executionTimeMillis : Int
}
```

Below is an example of matching a profile with a filter in real-time:

Operation

```
query profileMatching(
  $profileId: CDP_ProfileIDInput
  $namedFilters: [CDP_NamedFilterInput]
) {
  cdp {
    getProfile(profileID: $profileId) {
      _matches(namedFilters: namedFilters) {
        name
        matched
      }
    }
  }
}
```

Variables

```
{
  "profileId": {
    "clientID": "crm",
    "id": "crm-profile-id"
  },
  "namedFilters": [
    {
      "name": "continentMatch",
      "filter": {
        "properties": {
          "continent_equals" : "Europe"
        }
      }
    }
  ]
}
```

4.20. Data Intelligence

The collection of structured information in a CDP enables potential beyond simply accessing these data. By applying algorithms or machine learning techniques to the data, a CDP can act as a real-time data source for advanced use cases in other applications.

The collection of structured information in a CDP enables potential beyond simply accessing these data.

4.20.1. CDP_ScoredObject

Objects with a specific scoring

```
type CDP_ScoredObject {
    object : CDP_Object
    score : Float
}
```

4.20.2. CDP_AlgorithmInput

Defining a specific algorithm to apply.

```
input CDP_AlgorithmInput {
    name : String!
    parameters : JSON
}
```

Name

Implementation specific algorithms, examples may be `collaborative-filtering`, `clustering`, `deep`, `trending`, etc

Parameters

JSON object supported by the specified algorithm. Algorithm must validate object itself. Parameters can be used to filter the results of the recommendation algorithm or any other custom processing that is supported by the implementation.

4.21. Optimizations

A specific application of data intelligence is smart decision making, or optimizations. In short, an optimization is done by passing a number of objects in, and letting the system rank them according to which is considered optimal. For instance, which product is most relevant for a specific visitor.

4.21.1. CDP_OptimizationResult

The result of an optimization, containing scored objects

```
type CDP_OptimizationResult {
    name : String!
    scoredObjects : [CDP_ScoredObject]
}
```

4.21.2. CDP_OptimizationInput

Definition of the optimization to perform

```
input CDP_OptimizationInput {
    name : String!
    objects : [ID],
    eventOccurenceBoosts : [CDP_EventOccurenceBoostInput]
    strategy : String
    size : Int
}
```

Strategy

Any strategy supported by the algorithm: Unspecified, random, scoring, best first match, worst match, a/b test

4.21.3. CDP_EventOccurenceBoostInput

Used to boost positively/negatively the algorithm based on event type and time span: i.e. return a list of products the profile has viewed in the last year

```
input CDP_EventOccurenceBoostInput {
    eventType : String
    boost : Int
    fromDate : DateTime
    toDate : DateTime
}
```

Boost

Can also be a negative value

Example of an optimization of objects for a given profile :

Operation

```
query profileOptimizations(
  $profileId: CDP_ProfileIDInput
  $optimizationParameters: [CDP_OptimizationInput]
) {
  cdp {
    getProfile(profileID: $profileId) {
      _optimize(parameters: $optimizationParameters) {
        name
        scoredObjects {
          object {
            uri
            scheme
            path
            topics {
              name
              view {
                name
              }
            }
          }
          score
        }
      }
    }
  }
}
```

Variables

```
{
  "profileId": {
    "clientID": "crm",
    "id": "crm-profile-id"
  },
  "optimizationParameters": [
    {
      "name": "carPromotion",
      "objects" : [
        "cars:modelS",
        "cars:modelX",
        "cars:model3"
      ],
      "eventOccurenceBoosts": {
        "eventType": "configuredCar",
        "boost": 3.0,
        "fromDate" : "NOW-1MONTH",
        "toDate" : "NOW"
      },
      "strategy": "scoring",
      "size" : 2
    }
  ]
}
```

4.22. Recommendations

Unlike optimizations that act on a defined list of objects, recommendations take an object as input, only to suggest other objects based on a specific algorithm.

4.22.1. CDP_RecommendationResult

Provides a list of scored object

```
type CDP_RecommendationResult {
    name : String!
    scoredObjects : [CDP_ScoredObject]
}
```

4.22.2. CDP_RecommendationInput

```
input CDP_RecommendationInput {
    name : String!
    objectUri : ID
    topics : [ID]
    size : Int
    algorithm : CDP_AlgorithmInput
}
```

objectUri

Specific object that is the originator of the recommendation

topics

Objects have to be related to these specific topics

size

Maximum number of results to retrieve

Example of how to get a recommendation for a profile :

Operation

```
query profileRecommendations(
  $profileId: CDP_ProfileIDInput
  $recommendationParameters: [CDP_RecommendationInput]
) {
  cdp {
    getProfile(profileID: $profileId) {
      _recommend(parameters: $recommendationParameters) {
        name
        scoredObjects {
          object {
            uri
            scheme
            path
            topics {
              name
              view {
                name
              }
            }
          }
          score
        }
      }
    }
  }
}
```

Variables

```
{
  "profileId": {
    "clientID": "crm",
    "id": "crm-profile-id"
  },
  "recommendationParameters": [
    {
      "name": "similarBooks",
      "objectUri": "books:BOOK-ISBN-CODE",
      "topics": ["murderMysteries"],
      "size": 10,
      "algorithm": {"name": "similar"}
    }
  ]
}
```

5. Security Considerations

TODO REMOVE: (Note: OASIS strongly recommends that Technical Committees consider issues that could affect security when implementing their specification and document them for implementers and adopters. For some purposes, you may find it required, e.g. if you apply for IANA registration. While it may not be immediately obvious how your specification might make systems vulnerable to attack, most specifications, because they involve communications between systems, message formats, or system settings, open potential channels for exploit. For example, IETF \[RFC3552] lists “eavesdropping, replay, message insertion, deletion, modification, and man-in-the-middle” as well as potential denial of service attacks as threats that must be considered and, if appropriate, addressed in IETF RFCs.

In addition to considering and describing foreseeable risks, this section should include guidance on how implementers and adopters can protect against these risks We encourage editors and TC members concerned with this subject to read Guidelines for Writing RFC Text on Security Considerations, IETF \[RFC3552], for more information.)

6. Conformance

TODO REMOVE: (For the definition of "conformance clause," see OASIS Defined Terms. See "Guidelines to Writing Conformance Clauses": http://docs.oasis-open.org/templates/TCHandbook/ConformanceGuidelines.html.)

7. Appendix A. Acknowledgements

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

Participants:

- Participant Name, Affiliation | Individual Member
- Participant Name, Affiliation | Individual Member

8. Appendix B. Example Title

TODO: any additional appendices for non-normative text here

9. Appendix C. Revision History

Revision Date Editor Changes Made