Minerva Analytics 2.0 Events Reference Guide Rev D

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Minerva Analytics 2.0 Architecture Overview

Analytics Data Flow

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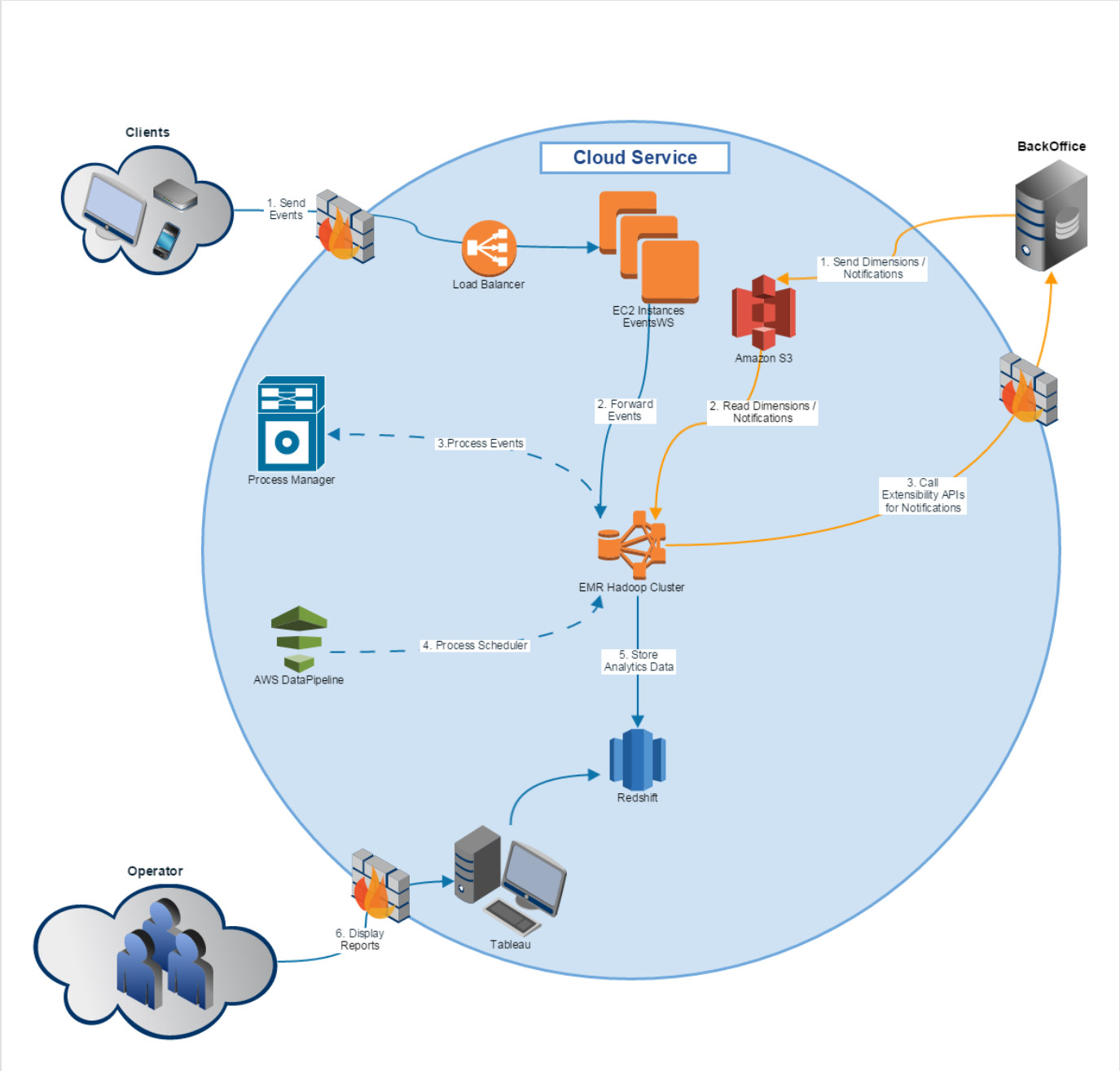

Summary of Data

Dimensions

Dimensions exports contain metadata from Back-Office.

- Examples: asset name, customer region, live program name, channel name, etc.

Notifications

Notifications contain object IDs sent to the cloud to keep the Dimensions up to date.

- Example: The account ID 12 subscribed to a new service

Events

Events contain IDs representing a basic client event used to track the user's behavior.

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- Examples: live channel tune-in, live channel tune-out, VOD start play, VOD stop play, search for “batman”, etc.

Analytics Data Processing

- Dimensions:
  - Format: json/bz2
  - Transfer: S3 exports.
  - Processing Frequency: 24hrs
- Notifications:
  - Format: json/bz2
  - Transfer: HTTPS
  - Processing Frequency: 2hrs
- Events:
  - Format: json
  - ETL Frequency: 15min

Different formats and frequencys are chosen based on the data segment size and the necessity of propagating the changes to the Cloud.

Events WS

- Jboss Linux server.
- Web Service:
  - Timestamp-based authentication.
  - HTTP Codes:
    - 401: Authentication failure
    - 503: Server overloaded
    - 200: OK
- Load Balancer AWS Service: Automatic region/HA.
- EventsWS endpoint.
  - Receives Events from clients.
  - Receives client requests for Trending.

Hadoop MapReduce Cluster

- ETL processing:
  - Dimensions
  - Notifications
  - Facts
- Datapipeline AWS Service, TaskRunner, Task Orchestration, Redshift loader.
- 1 Master for management, 2+ Cores for processing.
- Scalable core instances for load and file redundancy.

ETL Rules

- Min tune-in/tune-out and start/stop play threshold is 4 mins by default.
  - Threshold is configurable for each service provider in the Admin Config.
  - Choices are: 2, 3 or 4 minutes.
  - Reports won’t show any events with duration lower than this the threshold.
  - This limit does not apply to Trailers playback.
- Events expire after 5 hours.
  - Unprocessed events are stored on the Analytics ETL service for up to 5 hours after they have been generated by the clients.
  - Events will be discarded if they could not be processed passed this limit.
- Tune-in and start play events will be ignored if:
  - No corresponding tune-out or stop event received within 5 hours.
- Blackout period (provider’s local time).
  - Events are not processed between 1:00am and 4:00am.
  - Events will be stored until the ETL starts processing at 4:00am.
  - Notifications are not processed between 1:00am and 4:00am.
  - Notifications will be stored until the ETL starts processing at 4:00am.

Other Considerations

- Tune-in, Tune-outs are needed when the program on a channel finishes and the next program starts (even though the user did not do a tune-out of the channel).
- Tune-in and Tune-out events are sent only if the box acquired the program ID from the EPG.

Redshift Cluster

- Data Warehouse storage.
- Columnar DB for efficient storage.
- SQL querying for flexibility and simplicity.

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- Large capacity: 7 nodes, over 1 TB
- Automatic backup every 8 hours.

System Dependencies

- Installation using an auto-install for Minerva10.
- Extensibility is required for Analytics and Recommendations.
- Analytics and Recommendations are independent from each other.
- A Service Provider can choose between two setups:
  - Recommendations only.
  - Recommendations and Analytics.
- Needed prerequisites for the auto install:
  - Content Wise properties file.
  - Minerva Cloud properties file.
- Firewall rules need to be applied on the Service Provider site to allow communications to and from the Cloud.

System Backup

- The Cloud has specific backup procedures known by the Dev Ops:
  - Databases (Redshift/MySQL) are being backed up internally by Amazon.
  - Instances are not backed up, there is no sensitive data.
- Every component and all data in the Cloud is redundant and recoverable.
- No specific backup procedure is necessary on the Back-Office.

Minerva Analytics 2.0 Authentication

Server Webservice

Clients need to send events in JSON format as described in this document to this URL:

http://host:port/AnalyticsWS/eventApp/rest/processEvent/ingest

The host and port is returned by the Back-Office Application server follow webservice as described later (the authentication process is described below).

Authentication

Clients must authenticate in order to request the WebService. A failed authentication will result in a 401 error code returned by the WebService.

To authenticate, three parameters are required in the header of the HTTP request to the webservice:

- token: current timestamp of the server in seconds (UTC) (10 digits integer).
- chk: MD5(authentication key + token) (Concatenation of authentication key and token, for example: key="abcd", token="1342646788", hash = MD5("abcd1342646788")).
- puid: service provider ID that uniquely identify the service provider. Typically 8 alphanumerical characters.

The authentication key and the service provider ID are stored in iTVFusion database, table ANALYTICS_CONFIG. They are provided through get follow command in xtv webservice.

Example HTTP Request

```
POST /AnalyticsWS/eventApp/rest/processEvent/ingest HTTP/1.1
User-Agent: ...

Host: 192.168.0.0
Date: Tue, 17 Jul 2012 23:59:59 GMT
Content-Type: application/json
Content-Length: 507 puid: xxxxxxxx token: 1342646788
chk: 207c0f81b055ae69f0fc0bec9c3f9633

{"eventHeader":{ ... }}
```

Server Timestamp

Since clients' clock might not be synchronized with the server time, the server timestamp can be retrieved in 2 ways:

- /AnalyticsWS/eventApp/rest/processEvent/getUUID
- In the response of every JSON HTTP request sent to the client

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To reduce the server load, clients will only request /getUUID at the first time, and will use the returned value of every JSON HTTP request.

Clients can compute <device_current_timestamp> - <server_timestamp>, and add this value to the timestamp of the next HTTP request.

Server Validation

The server will check:

- The provider ID (puid)
- The token: the value is checked against the current server time with the configured tolerance (2min by default).
- chk: the server computes MD5(authentication key + token), and validate it against the provided value. The authentication key is specific to the provider ID.

Authentication failure will result in a HTTP error code:

- 401 - Authentication failure resulting from invalid authentication key.
- 406 - Authentication failure resulting from expired request (ie. invalid time synchronization between the device and backoffice).

Follow commands returns the configurations needed to the clients using the following tags:

"analytics":{"host":"minerva.us-east- 1.elb.amazonaws.com","port":8080,"maxEvents":5,"timeout":1," key":"mn2150KEY","serviceProviderId":" providerid","version": "2.0","randomizationWindow":180}

Implicit Tune-in/Tune-out

Tune-in, Tune-outs are needed when a program on a channel finishes and the next program starts--even though the user did not do a tune-out of the channel. Such events are called an Implicit Tune-in/Tune-out and are needed for LiveTV Trending functionality.

The follow command returns the parameter "randomizationWindow" with the default value: 180 seconds.

The client is expected to send the Implicit Tune-in/Tune-out with random seconds of delay that fall between the randomization window. This is to prevent the clients from flooding the server at exactly the same second.

For example, if a program ends at 10:30 a.m., the Implicit Tune-Out is expected at 10:30 + random_number (where the random_number value is between 1 and 180).

- Client A : 10:30 am + 30 seconds
- Client B : 10:30 am + 33 seconds

The same applies for Tune-In.

> **Note:**
>
> Randomization is applicable to only Implicit Tune-in/Tune-out and should not be applied to user-driven explicit actions.

Minerva Analytics 2.0 Event Structure

Analytics Event Structure v2.0.3

Event Header

"Header Param Id (Key #)"	Header Param Name	Value Type	Comment
1	System Type Id	Integer	
2	Subsystem Type Id	Integer	
3	Subsystem Id	String	
4	Customer Id	String	
5	Account Id	Integer	
6	Service Provider ID	String	Server will populate this field, using the HTTP header of the events. Client need not send it here.

Event

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Event Param Id (Key #)"	Event Param Name	Value Type	Comment
10	Event Type Id	Integer	
11	Event Time	Long<GMT Time> (in seconds)	
12	Application Id	String	
13	Object Type Id	Integer	
14	Object Id	String	
15	Protocol Id	Integer	
16	Event Value	String	
17	Player Status Id	Integer	
18	Trickplay Id	Integer	
19	Log Level Id	Integer	
20	Log Value	String	
21	Duration	Integer	
22	sub Object Id	String	Generally the program ID
23	StripeId	String	Navigation report only
24	PageId	String	
25	PageFrom	String	
26	StripeFrom	String	

JSON Structure

{eventHeader : { header_key : value, …, event: [{ event_key : value, … }, …] }}

Example:

```
{
        "eventHeader":{
                1:2,                          // System Type is a client
                2:1,                          // SubSystem Type is a STB
                3:"81",
                4:"MD11609",                  // Customer Id
                5:"54132",                   // Account Id
                "event":[{                   // 1st event
                        10:51,                   // This a Tune-In event
                        11:1336694919,
                        12:"5",
                        13:1,
                        14:"22",
                        15:2,
                        19:3
        },{                                  // 2nd event
                        10:1                  // This is a Enter EPG event

        }]
}
```

Minerva Analytics 2.0 Events

Group ID 2: UI Purchase

Group 2: Purchase

Event ID	Event Name	Sub Param Name	Comments	STB Client version	Mobile Clients	Reported in Server version

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41	Purchase VOD	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15)		5.7SP4+	Implemented	2.0
		EventValue(Key #16)	PurchasePrice of the VOD. Report if even 0. Do Not report this event for SVODs. Price should be unformatted.			
44	Puchase VOD Bundle	LogLevelId (Key #19) ObjectTypeId (Key #13)		5.7SP4+	Not Implemented	2.0
		ObjectId (Key #14)	BundleId i.e resourceID in webservices			
		SubObjectId (Key #22)	comma separated assetIds i.e. resourceIds			
		EventValue(Key #16)	PurchasePrice of the VOD bundle. Report if even 0. Price should be unformatted.			

Group ID 3: Asset Player

Event ID	Event Name	Sub Param Name	Comments	STB Client version	Mobile Clients	Reported in Server version
31	Start Playing	LogLevelId (Key #19)	Covers VOD, LDVR, NDVR, RestartTV , DLNA, Youtube, Picasa, CUTV, Metachannels , Trailer	5.6 +	Implemented	2.0
		ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15)				
		SubObjectId (Key #22)	Only for restart TV, LDVR/NDVR playback			
32	Buffering			Not Implemented	Not Implemented	Not Implemented
35	Asset Trickplay	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15) TrickplayType (Key #18)		5.6 +	Implemented	2.0
		SubObjectId (Key #22)	Only for restart TV, LDVR/NDVR playback			
		Duration (Key #21)				

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36	Stop Playing	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15) PlayerStatusId (Key #17)		5.6 +	Implemented	2.0
		SubObjectId (Key #22)	Only for restart TV, LDVR/NDVR playback			
		Duration (Key #21)				

Group ID 4: Recording (DVR)

Event ID	Event Name	Sub Param Name	Comments	STB Client version	Mobile Clients	Reported in Server version
60	Start Recording	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) SubObjectId (Key #22) ProtocolTypeId (Key #15)		5.7SP4+	Implemented	2.0
61	Stop Recording	LogLevelId (Key #19)	Only successful recordings.	5.7SP4+	Implemented	2.0
		ObjectTypeId (Key #13) ObjectId (Key #14) SubObjectId (Key #22) ProtocolTypeId (Key #15) Duration (Key #21)				
		EventValue	DVR usage percentage			

Group ID 5: Live Channel

Event ID	Event Name	Sub Param Name	Comments	STB Client version	Mobile Clients	Reported in Server version
51	Tune-In	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15) SubObjectId (Key #22)		5.6 +	Implemented	2.0

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52	Tune-Out	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15) Duration (Key #21) SubObjectId (Key #22)		5.6 +	Implemented	2.0
53	Live Trickplay	LogLevelId (Key #19) ObjectTypeId (Key #13) ObjectId (Key #14) ProtocolTypeId (Key #15) TrickplayType (Key #18) Duration (Key #21) SubObjectId (Key #22)		5.6 +	Implemented	2.0

Group ID 8: Action Search

Event ID	Event Name	Sub Param Name	Comments	STB Client version	Mobile Clients	Reported in Server version
81	Search Federated	LogLevelId (Key #19)		5.7SP4	Implemented	2.0
		EventValue	This is the search String			
82	Search Vod	LogLevelId (Key #19)		M10	Implemented	2.0
		EventValue	This is the search String			
84	Search EPG	LogLevelId (Key #19)		M10	Implemented	2.0
		EventValue	This is the search String			

Minerva Analytics 2.0 Lookups

Object Type

Object Type Id (Key #13)	Object Type Name	Object Id (Key #14)	SubObject Id (Key #22)
1	Live Channel	channelId	programId
2	PPV Channel	channelId	programId
3	ReverseEPG/CUTV	channelId	programId
3	CUTV (older cutv ASQ based)	catchupTVKey	
4	Youtube	youtubeAssetKey	N/A
5	Picasa	picasaPictureKey	N/A
6	Metachannels	metachannelsAssetKey	N/A
7	Rentals / VOD	vodAssetId (i.e resourceId in webservices)	N/A
8	NDVR	channelId	assetId
9	LDVR	channelId	assetId
10	DLNA	dlnaMediaTypeId	N/A
11	Widget	widgetId	N/A

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12	Restart TV	channelId	programId
13	Trailer	TrailerId	N/A
14	VOD Bundle	Asset BundleID (i.e resourceId in webservices)	comma seperated assetIds ie. resourceIds

Subsystem Type

Subsystem Type Id (Key #2)	Subsystem Type name	SubsystemId (Key #3) (value type expected)
1	STB	<deviceId>
2	iPhone	<deviceId>
3	iPad	<deviceId>
4	Android Phone	<deviceId>
5	Android Tablet	<deviceId>
6	iTv Fusion	<serverId>
7	iTv Link	<serverId>
8	OTT	<serverId>
9	NDVR	<serverId>
10	YourTV Web	<deviceId>
11	Roku	<deviceId>
12	Windows Surface	<deviceId>
13	Windows RT	<deviceId>
14	Xbox	<deviceId>
15	LG SmartTV	<deviceId>
16	Samsung SmartTV	<deviceId>
17	Sony SmartTV	<deviceId>
18	PS3	<deviceId>
19	Amazon FireTV	<deviceId>
20	AndroidTV	<deviceId>
21	Chromecast	N/A

Log Level

Log Level Id (Key #19)	Log Level Name
1	Error
2	Warning
3	Info
4	Fatal
5	Debug

System Type

System Type Id (Key #1)	System Type name
1	Client

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Account Type

Account Type Id that an Account Id belongs to	Account Type Name
1	Primary
2	Sub Account

Media Quality

Media Quality Id that an Asset belongs to	Media Quality Name
1	SD
2	HD

OTT Content Provider

ID (Same as Object Type Id) (Only relevant for OTT Events)	Name
4	Youtube
5	Picasa
6	Metachannels

Protocol

Protocol Id (Key #15)	Protocol Name
1	Http
2	Hls
3	RTSP
4	DVB-T
5	DVB-C
6	DVB-S
7	DVB-S2
8	ATSCC
9	SS (Smooth Streaming)
10	DLNA
11	Multicast Channel
12	ISDB-T

Event Value

EventValue Id (Key #16)	System Status Name
1	Clean
2	Dirty
3	Unused
4	autodeleted
5	usercommand

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DLNA Media Type

– "DLNA Media Type Id Object Id (Key #14)"	– Media Type Name
1	Music
2	Video
3	Photo

Application

Application Id (Key #12)	Application Name
1	Minerva

Player Status

Player Status Id (Key #17)	Player Status Name
1	End of File
2	User Command

Trickplay

Trickplay Type Id (Key #18)	Trickplay Type Name
1	Fast Forward
2	Rewind
3	Skip
4	Pause
5	Seek

Content_type

- VOD
- OTT
- DLNA
- Widget
- PPV Program
- Live Channel Program
- XPVR Program
- CatchUp TV Program

Minerva Analytics 2.0 Error Codes

The following error codes are sent by Cloud:

Error Code	Description
httpErrorCode.emptyCredentials=401	# Error Code when Provider Id Or Hash is not specified in the request
httpErrorCode.invalidChecksum=401	# Error Code when a) Authentication Key is not found Or b) Provider Id & Token does not result in a valid Hash
httpErrorCode.tokenExpiry=406	# Error Code when the request has reached the server later an acceptable time limit

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httpErrorCode.emptyEventsHeader=422	# Error Code when the request has a missing Events Header that contains Events generated from Devices
httpErrorCode. serverQueueCapacity=503	# Error Code when the Server cannot process anymore Events as it has reached its capacity

Change Log

Revision	Date	Change Details
00	2017-11-30	Initial release.
Rev A	2017-12-19	• Added section, "Analytics 2.0 Authentication" • Added section "Analytics 2.0 Error Codes".
Rev B	2018-06-14	• Added “AndroidTV” to Subsystem Type. • Added section Implicit Tune-in/Tune-out.
Rev C	2019-10-01	Updated tune-in and start events in section ETL Rules.
Rev D	2020-10-13	• Added Lookup Tables: Account Type, Media Quality, OTT Content Provider. • Added Sub System Type in (Subsystem Type Lookup) for Chromecast.

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