

# **IBM Security Information Queue Version Version 1.0.3 Performance Report**



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## *IBM Security Information Queue Version 1.0.3 Performance Report*

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This report contains internal performance measurements of IBM Security Information Queue 1.0.3. These measurements should be used for planning purposes but note the following: They are derived in a laboratory environment, based on specific configurations that are described herein. They are only a guideline for estimating performance. Performance results in a production environment will vary based upon the specific parameters and uniqueness of the environment.

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## Abstract

IBM Security Information Queue (ISIQ) is a cross-product integrator that utilizes Kafka technology and publish-subscribe model to integrate data between IBM® Security products such as IBM Security Identity Manager (ISIM) and IBM Security Identity Governance and Intelligence (IGI). This report provides performance measurements in terms of throughput, response times, and processor utilization. This report includes hardware and software environmental details and descriptions of the benchmarks and methodologies used to derive performance measurement.

## Introduction

This report is divided into several sections. The first section describes the test environment including hardware, software and performance tuning. Subsequent sections details measurement results for benchmarks.

## Test Environment

This section describes the test environment, configuration information, and test parameters used to derive the measurements in this report.

## Software

The following software was used in performance testing. Refer to the product documentation for information about software prerequisites.

### IBM Security Information Queue (ISIQ)

IBM Security Information Queue version 1.0.3 was used in the performance environment. The versions of different components of ISIQ were as follows:

#### *Docker Version*

Docker CE version 18.09.7, build 2d0083d

<b>Parent Component</b>	<b>Parent Component Version</b>	<b>Child Component</b>	<b>Child Component Version Data</b>
Docker Client	18.09.7		
		API	1.39
		Go	1.10.8
		OS/Arch	Linux/amd64
		Experimental	False
Docker Server	Community		
Docker Engine	19.09.3		
		API	1.39
		Go	1.10.8
		Git commit	2d0083d

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		OS/Arch	Linux/amd64
		Experimental	False
Nginx	1.15.9		
Zookeeper	3.4.13		
Kafka	5.1.2		
Kafka-rest	5.1.2		
Influxdb	1.7.4-alpine		
Elasticsearch	6.6.1		
Logstash	6.6.1		
Logspout	3.2.6		
Jmxtrans	Latest		
Kibana	6.6.1		
Grafana	5.4.3		

ISIQ was deployed across a variety of machines whose base OS was one of the following:

- 64-bit Red Hat Enterprise Linux Server release 7.3, 7.4, 7.5, 7.6 (Maipo)
- Cent OS (7)

## **IBM Security Identity Manager (ISIM)**

ISIM versions:

- IBM Security Identity Manager version 7 Fix Pack 9
- IBM Security Identity Manager v6 FP19,
- IBM Security Identity Manager v7 FP11.

ISIM Data Tier

- IBM DB2 v11.1.4.4 Fix Pack4,
- IBM Security Directory Server (SDS) v 6.4 Fix Pack 16.

The ISIM Virtual Appliances were run on one of the following ESXi machines:

- VMware ESXi 6.5.0

The ISIM DB2 were installed across a variety of machines whose base OS was one of the following:

- 64-bit Red Hat Enterprise Linux Server release 7.4
- 64-bit Red Hat Enterprise Linux Server release 7.6

## **IBM Security Identity Governance and Intelligence (IGI)**

IBM Security Identity Governance and Intelligence version:

- IGI v5.2.4 Fix Pack 1
- IGI v5.2.4 Fix Pack 1, Interim Fix 1
- IGI v5.2.4 Fix Pack 1, Interim Fix 1, and Interim Fix 2

#### **IGI Data Tier**

- IBM DB2 v11.1.4.4 Fix Pack4

The IGI Virtual Appliances were run on one of the following ESXi machines:

- VMware ESXi 6.0.0
- VMware ESXi 6.5.0

The ISM DB2 were installed across a variety of machines whose base OS was one of the following:

- 64-bit Red Hat Enterprise Linux Server release 7.4
- 64-bit Red Hat Enterprise Linux Server release 7.6

#### **Tuning**

All software was tuned as specified in the following tuning guides

- *IBM Security Identity Manager 6.0 / 7.0 Performance Tuning Guide*
- *IBM Security Identity Governance and Intelligence (IGI) 5.2.4 Performance Tuning Guide*
- *IBM security Information Queue (ISIQ) deployment and User's Guide*

Any other tuning is documented in the detailed measurement sections later in this document.

#### **WebSphere Application Server Java Version Machine**

4 GB was allocated to the WAS JVM on 64-bit platforms

#### **DB2**

The Self-Tuning Memory Manager (STMM) was enabled for both the ISIM database and the ITDS database. Automatic runstats was enabled for both the ISIM database and the ITDS database with the maintenance policies updated to exclude the required tables. The script perf tune\_runstats.sh was used to do runstats against all the tables to update the cardinalities as specified in the tuning guide.

Several monitor switches on the DB2 database were enabled during testing using the following commands.

- db2 update database manager configuration using DFT\_MON\_STMT ON
- db2 update database manager configuration using DFT\_MON\_BUFPOLL ON
- db2 update database manager configuration using DFT\_MON\_LOCK ON
- db2 update database manager configuration using DFT\_MON\_SORT ON
- db2 update database manager configuration using DFT\_MON\_TIMESTAMP ON
- db2 update database manager configuration using DFT\_MON\_UOW ON

Prior to test execution, the DB2 command *runstats* is used to update table statistics. (Note: For PostgreSQL, the *analyze* command is used for equivalent tuning)

In keeping with general database administration best practices, the DB2 environments have been optimized by performing a DB reorg on the tables and on the indexes, and by executing db2rbind prior to performance testing.

## Network

All machines tested in this report were connected to a 1Gbps Ethernet network

## Standard Performance Evaluation Corporation (SPEC) rating

To assist the reader in comparing the performance test machines with other hardware, the SPEC rating of each machine has been included. The value used was the SPEC CPU2000 integer base throughput rate (SPECint\_rate2006, base value).

More information on this benchmark and the rating of various hardware can be found on the SPEC website at <http://www.spec.org/cpu2006/CINT2006/>

## Hardware and Virtual Machine

The ISIQ performance test required setting up an ISIQ, ISIM, and IGI environment in order to execute the performance test scenarios. The ISIQ performance test scenarios were executed in three different environments each comprising of ISIQ, ISIM, and IGI components. Following are the details of each environments:

### Environment 1 (40K Environment)

#### Physical Machine Configuration

Test System	SPEC CINT Rating	CPU (GHz)	Cores	Memory	Operating System	Model
ISIQ	1080	2.4	4skt 10 cores per socket	520GB	RHEL7.4	X3850 X5
ISIM VA	210	2.40	2skt, 4 cores per skt	16GB	VA on MCP	VM running on ESXI 6.7.0
ISIM SDS	205	2.40	2skt, 4 cores per skt	24GB	RHEL7.6 (Mapio)	Dell Power Edge R710
ISIM DB	210	2.40	2skt, 4 cores per skt	24GB	RHEL7.6 (Mapio)	Dell Power Edge R510
IGI VA	139.7	2.67	4	16GB	VA on MCP	VM running on ESXI 6.7.0
IGI DB	318	2.93	12	12GB	RHEL7.6 (Mapio)	IBM System x5670

#### ISIM Data

Entity	Total Count
Person	40,001
ITIM Account	40,001
LDAP Account	40,000
ITIM Group	5
Default Role	3
LDAP Profile	4
Organization	1
ITIM Profile	1

## Environment 2 (9K Complex Environment)

### Physical Machine Configuration

Test System	SPEC CINT Rating	CPU (GHz)	# Cores	Memory	Operating System	Model
<b>ISIQ 1</b>	225	2.67	4skt, 4 cores per skt	32GB	RHEL7.4 (Mapio)	IBM System x3400 M3
<b>ISIQ 2</b>	225	2.67	4skt, 4 cores per skt	32GB	CentOS 7	IBM System x3400 M3
<b>ISIQ 3</b>	225	2.67	4skt, 4 cores per skt	32GB	RHEL7.4 (Mapio)	IBM System x3400 M3
<b>ISIM VA</b>	334	2.90	2skt, 4 cores per skt	16GB	VA on MCP	VM running on ESXI 6.7.0
<b>ISIM SDS</b>	501	2.90	2skt, 6 cores per skt	128GB	RHEL7.6 (Mapio)	Dell Power Edge T620
<b>ISIM DB</b>	389	3.47	2skt, 6 cores per skt	24GB	RHEL7.6 (Mapio)	IBM x3650 M3
<b>IGI VA</b>	112.5	2.67	2skt, 2 cores per skt	16GB	VA on MCP	VM running on ESXI 6.7.0
<b>IGI DB</b>	1080	2.4	4skt, 10 cores per skt	515GB	RHEL7.6 (Mapio)	IBM System x3650

### ISIM Data

Entity	Total Count
LDAP Group Profile	62,500
LDAP Account	12,529
LDAP Profile	11,501
Person	9,220
ITIM Account	8,675
Default Role	1,081
Posix Linux Profile	1,020
Admin Domain	500
Organizational Unit	102
ITIM Group	7
Location	5
Organization	1
ITIM Profile	1

## Environment 3 (300K Environment)

### Physical Machine Configuration

Test System	SPEC CINT Rating	CPU Speed	#Cores	Memory	Operating System	Model
<b>ISIQ 1</b>	225	2.67	4skt, 4 cores per skt	32GB	RHEL7.4 (Mapio)	IBM System x3400 M3
<b>ISIQ 2</b>	225	2.67	4skt, 4 cores per skt	32GB	RHEL7.4 (Mapio)	IBM System x3400 M3

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<b>ISIQ 3</b>	225	2.67	4skt, 4 cores per skt	32GB	RHEL7.4 (Mpio)	IBM System x3400 M3
<b>ISIM Node 1</b>	210	2.4	2skt, 4 cores per skt	16GB	VA on MCP	VM running on ESXI 6.5.0
<b>ISIM Node 2</b>	238	2	2skt, 4 cores per skt	16GB	VA on MCP	VM running on ESXI 6.5.0
<b>ISIM SDS</b>	444	2.5	2skt, 6 cores per skt	48GB	RHEL7.4 (Mpio)	IBM x3650 M4
<b>ISIM DB</b>	210	2.4	2skt, 4 cores per skt	24GB	RHEL7.4 (Mpio)	Dell PowerEdge R510
<b>IGI VA</b>	108.5	2.53	2skt, 2 cores per skt	16GB	VA on MCP	VM running on ESXI 6.5
<b>IGI DB</b>	271	3.07	2skt, 4 cores per skt	515GB	RHEL7.4 (Mpio)	IBM System x3650

### ISIM Data

<b>Entity</b>	<b>Total Count</b>
Person	301,014
ITIM Account	226,014
LDAP Account	150,004
ITIM Group	5
Default Role	5
LDAP Profile	3
Organizational Unit	2
Organization	1
ITIM Profile	1

## ISIM Virtual Appliance Cluster Configuration

This paper describes the performance test scenarios and execution for ISIQ. The test scenario has been divided into two sections:

- 1 Initial Load Scenario
- 2 Delta Scenarios

### Initial Load Scenario

The initial load or on boarding scenario is when the product ISIM and IGI are configured in ISIQ and the data is transferred to IGI. Initially, the ISIM consists of the data based on the environment as discussed in the previous section. The IGI environment is empty with no data. When the products ISIM and IGI are configured in the ISIQ, the ISIQ creates the product specific topics and loads the data from ISIM and IGI into the topics. When the topics gets loaded with the events from the ISIM, IGI is subscribed to ISIM. Once the subscription is created then the events from the IGI topics are created by ISIQ. The ISIQ then pushes the events into IGI from the IGI topics. The following diagram shows the data flow from ISIM to IGI using the ISIQ.

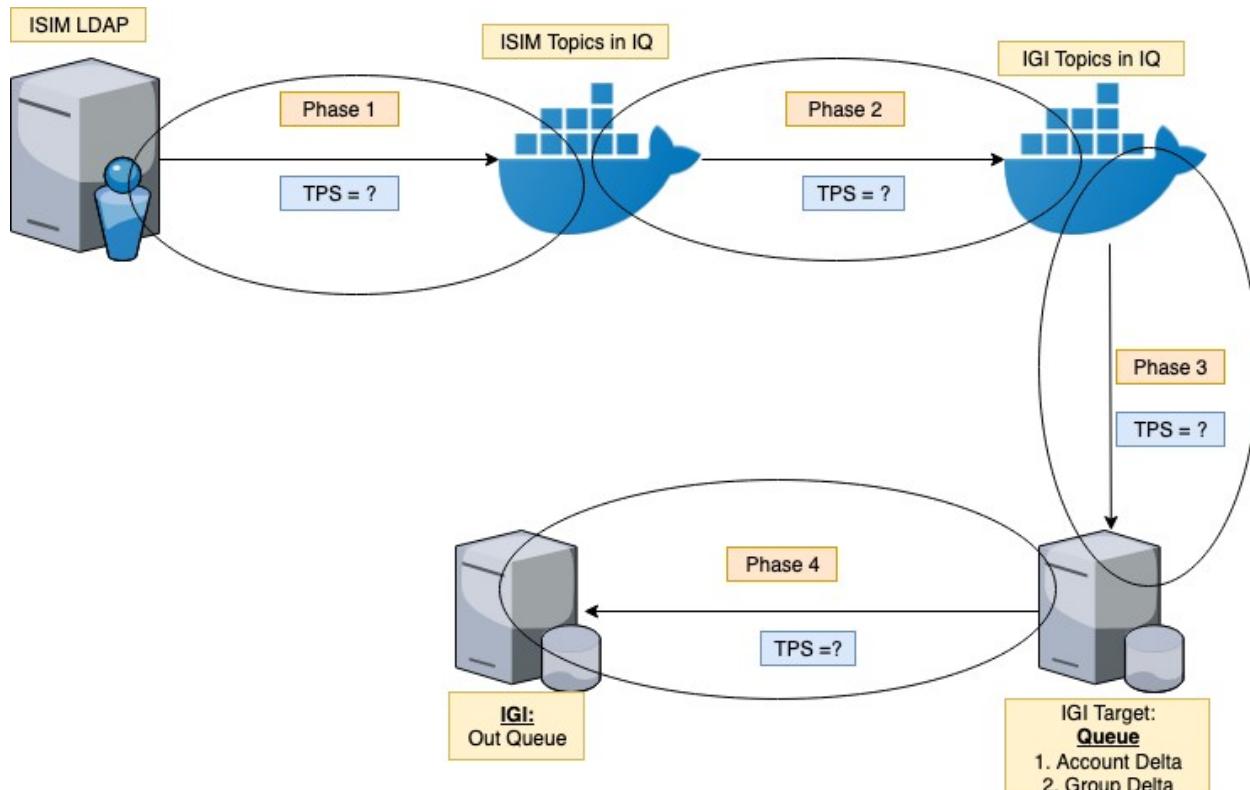


Figure: ISIQ data flow

The figure above shows the data flow from ISIM to IGI using ISIQ. The performance test execution of ISIQ has been divided into 4 phases as shown in the figure above.

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The transaction per second (TPS) is calculated during each phase. The four phases are explained below:

- Phase 1 (from ISIM SDS server into ISIM topics in ISIQ):  
During phase1, the ISIM product is configured in ISIQ. Once the product is configured in ISIQ, the ISIQ creates the topics based on the data in ISIM SDS server and inserts the data as events into the topics.
- Phase 2 (from ISIM topics in ISIQ to IGI topics in ISIQ):  
During phase 2, the IGI is subscribed to ISIM. When the subscription is created the ISIQ created the IGI topics and transfers the events from the ISIM topics into IGI topics.
- Phase 3 (from IGI topics in ISIQ to IGI Target Queues):  
During phase 3, the ISIQ pushes the data into IGI, and it is loaded into the IGI target queues, and are processed thereafter.
- Phase 4 (from IGI Target Queues to IGI Out Queues):  
During phase 4 the IGI processes the data in the target queues and are stored in to the out queues.

Initially the ISIM and IGI are configured in the ISIQ. The example of ISIM product configuration is shown in the image below:

Configure IBM Security Identity Manager

Configuration Name	Description (optional)	
isim	isim	
Directory Source URL	WebServices URL	Database URL
ldap://isim-ldap:389	https://isimva:9082	jdbc:db2://isimdb:60000/itimdb
Directory User DN	WebServices User	Database User
cn=root	itim manager	itimuser
Directory Password	WebServices Password	Database Password
.....	.....	.....
Database Secure Connection		
<input type="radio"/> Yes <input checked="" type="radio"/> No		
<input type="button" value="Cancel"/> <input type="button" value="&lt; Back"/> <input type="button" value="Configure &gt;"/>		

Figure: ISIM Product Configuration in ISIQ

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The example below shows the IGI product configuration in ISIQ:

Configure IBM Identity Governance and Intelligence

Configuration Name	Description (optional)
igi	igi
Database URL	Database User
jdbc:db2://igi-db:60000/igidb	igacore
Database Secure Connection	Database Password
<input type="radio"/> Yes <input checked="" type="radio"/> No	.....

Figure: IGI Product Configuration in ISIQ

Once both products are configured in ISIQ and the ISIM related topics are loaded with events, the IGI is subscribed to ISIM. The example of the subscription page is shown below:

Owner: admin

Product Dashboard

Status

IGISource	2 Task(s) Running	0 Task(s) Paused	0 Failed
IGIdatabase	10 Task(s) Running	0 Task(s) Paused	0 Failed

Subscriptions

isim	isim	Last updated: 2019-05-30 21:16 GMT	
------	------	------------------------------------	--

Figure: Subscription page in ISIQ

## Initial Load Scenario (40K)

The 40k Initial load scenario was performed on Environment 1 as explained [here](#). The IGI is empty at the beginning of the test but the ISIM consists of the following data:

<b>Entity</b>	<b>Total Count</b>
Person	40,001
ITIM Account	40,001
LDAP Account	40,000
ITIM Group	5
Default Role	3
LDAP Profile	4
Organization	1
ITIM Profile	1

As explained previously, the throughput are calculated for each phases of the run.

### Phase 1

Phase 1 consists of the duration of test where we create a configuration of ISIM Directory server in the ISIQ. The ISIQ creates the ISIM topics and loads all the events from the ISIM Directory server into the topics. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

<b>Topic</b>	<b>Completion Time (sec)</b>	<b>No. of Events</b>
admin.isim.directory.Person	58	40,001
admin.isim.directory.ITIMAccount	49	40,001
admin.isim.directory.LdapAccount	61	40,000
admin.isim.directory.ITIMGroup	0	5
admin.isim.directory.DefaultRole	0	2
admin.isim.directory.LdapProfile	0	1
admin.isim.directory.Organization	0	1
admin.isim.directory.ITIMProfile	0	1

### Phase 1: Throughput Calculation

<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
120,016	565	212.42 events/sec

## Phase 2

Phase 2 of the test execution consists of the duration of the test where we create an IGI product in ISIQ and subscribe ISIM product to it. and it loads the data from ISIM topics to its IGI topics. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

<b>Topic</b>	<b>Completion Time (sec)</b>	<b>No. of Events</b>
admin.igi.IGI_database.ACOUNT	6	80,001
admin.igi.IGI_database.USER_ERC	5	40,001
admin.igi.IGI_database.SERVICE_GROUP	0	5
admin.igi.IGI_database.ROLE	0	2
admin.igi.IGI_database.SERVICE	0	2
admin.igi.IGI_database.OU_ERC	0	1

### Phase 2: Throughput Calculation

<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
120,016	7	17,145.14 events/sec

## Phase 3

Phase 3 of the test includes the period of the test where ISIQ pushes all the data into the IGI application and it shows up in the Target queue. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

<b>Queue</b>	<b>Completion Time (sec)</b>	<b>No. of Events</b>
In Org. Unit events	0	1
In User events	9857	40,001
Target Inbound -Access events	1	8
Target Inbound -Account events	10026	160,006

### Phase 3: Throughput Calculation

<b>Queue</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
In User Events	40,001	9857	4.06 events/sec
Target Inbound -Account events	160,006	10026	15.96 events/sec

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### **Phase 4**

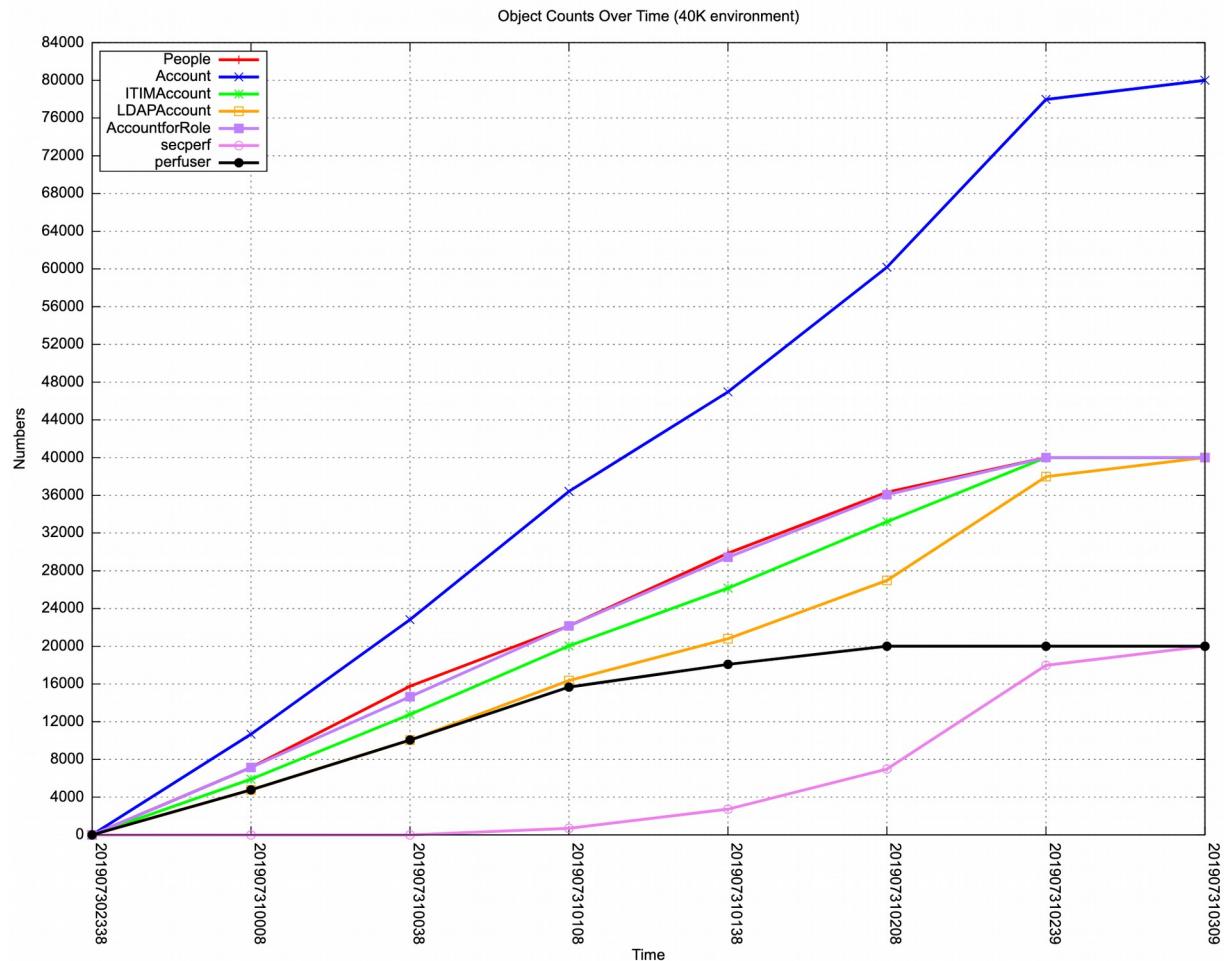
The fourth and final phase of the test is when the IGI application pushes the events to its Out Queue. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

<b>Queue</b>	<b>Completion Time (sec)</b>	<b>No. of Events</b>
Out Events	10647	160,004

Phase 4: Throughput Calculation

<b>Queue</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
Out Events	160,004	10647	15.03 events/sec

## Object Count Over Time



## Initial Load Scenario (9K Complex)

The 40k Initial load scenario was performed on Environment 2 as explained [here](#). The IGI is empty at the beginning of the test but the ISIM consists of the following data:

Entity	Total Count
LDAP Group Profile	62,500
LDAP Account	12,529
LDAP Profile	11,501
Person	9,220
ITIM Account	8,675
Default Role	1,081
Posix Linux Profile	1,020
Admin Domain	500
Organizational Unit	102
ITIM Group	7
Location	5

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Organization	1
ITIM Profile	1

Throughput are calculated for each phase.

### Phase 1

Phase 1 consists of the duration of test where we create a configuration of ISIM Directory server in the ISIQ. The ISIQ creates the ISIM topics and loads all the events from the ISIM Directory server into the topics. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

Topic	Completion Time (sec)	No. of Events
admin.isim.directory.LdapGroupProfile	48	62,500
admin.isim.directory.LdapAccount	59	12,529
admin.isim.directory.LdapProfile	14	11,501
admin.isim.directory.Person	14	9,220
admin.isim.directory.ITIMAccount	10	8,095
admin.isim.directory.DefaultRole	0	1,081
admin.isim.directory.PosixLinuxProfile	1	1,020
admin.isim.directory.AdminDomain	0	500
admin.isim.directory.OrganizationalUnit	0	102
admin.isim.directory.ITIMGroup	0	7
admin.isim.directory.Location	0	5
admin.isim.directory.Organization	0	1
admin.isim.directory.ITIMProfile	0	1

### Phase 1 Throughput Calculation

Total Number of Events	Completion Time (sec)	Throughput
106,562	75	1420.83 events/sec

### Phase 2

Phase 2 of the test execution consists of the duration of the test where we create an IGI product in ISIQ and subscribe ISIM product to it. and it loads the data from ISIM topics to its IGI topics. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data

Topic	Completion Time (sec)	No. of Events
admin.igi.IGI_database.SERVICE_GROUP	7	62,507
admin.igi.IGI_database.ACOUNT	3	20,642
admin.igi.IGI_database.SERVICE	0	12,522
admin.igi.IGI_database.USER_ERC	0	9,220
admin.igi.IGI_database.ROLE	2	1,081
admin.igi.IGI_database.OU_ERC	0	608

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### Phase 2 Throughput Calculation

Total Number of Events	Completion Time (sec)	Throughput
106,580	7	15,225.71 events/sec

### Phase 3

Phase 3 of the test includes the period of the test where ISIQ pushes all the data into the IGI application and it shows up in the Target queue. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

Queue	Completion Time (sec)	No. of Events
In Org. Unit events	16	608
In User events	9590	9,220
Target Inbound -Access events	1159	63,588
Target Inbound -Account events	27732	57,632

### Phase 3 Throughput Calculation

Queue	Total Number of Events	Completion Time (sec)	Throughput
In User Events	9,220	9590	0.96 events/sec
Target Inbound -Access events	63,588	1159	55.00 events/sec
Target Inbound -Account events	57,632	27732	2.08 events/sec

### Phase 4

The fourth and final phase of the test is when the IGI application pushes the events to its Out Queue. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

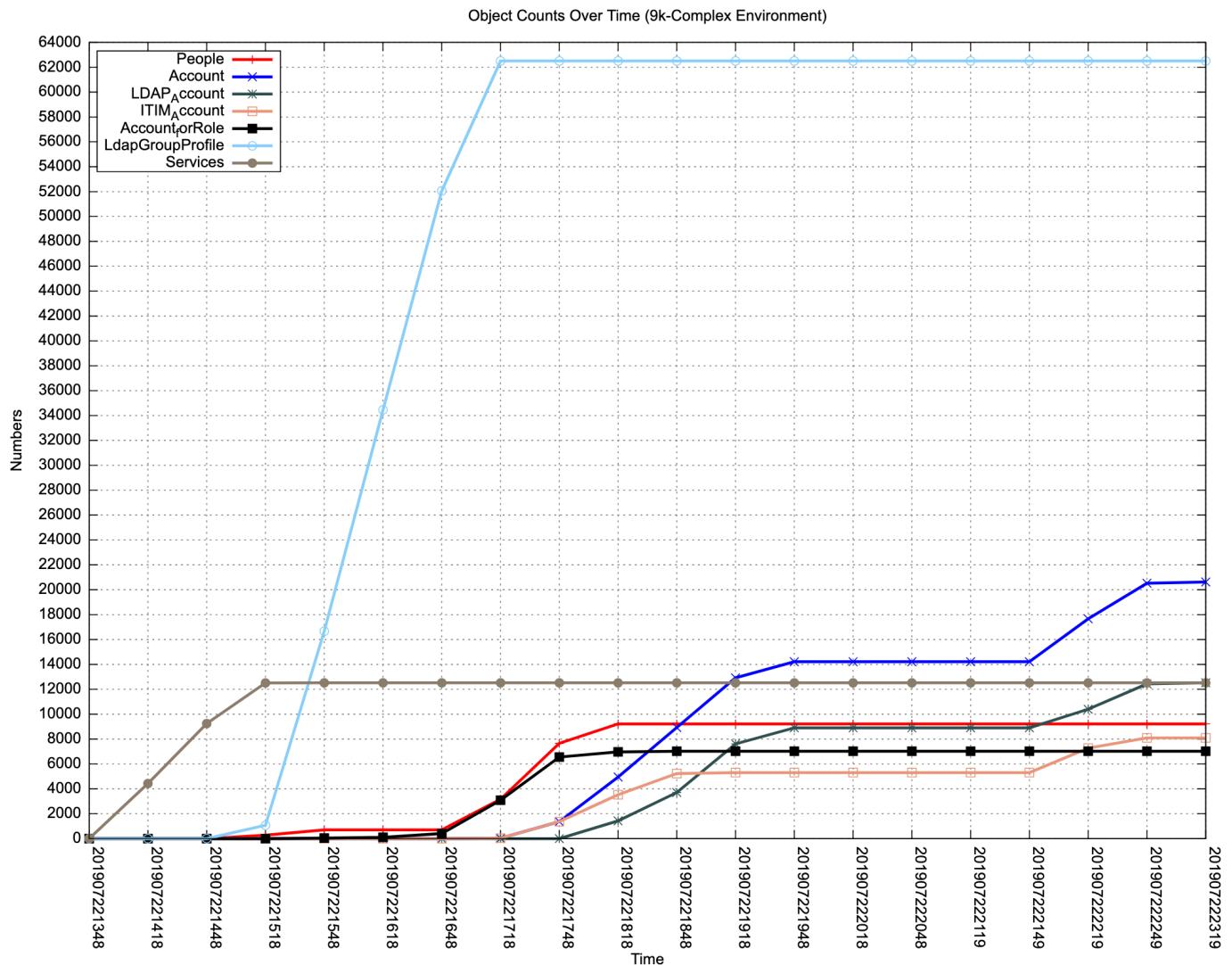
Queue	Completion Time (sec)	No. of Events
Out Events	27740	56,543

### Phase 4 Throughput Calculation

Queue	Total Number of Events	Completion Time	Throughput
Out Events	56,543	27740	2.04 events/sec

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### Object Count Over Time



### Initial Load Scenario (300K)

The 300k Initial load scenario was performed on Environment 3 as explained [here](#). IGI is a fresh install and ISIM directory server object types are as follows

Entity	Total Count
Person	301,014
ITIM Account	226,014
LDAP Account	150,004
ITIM Group	5
Default Role	5
LDAP Profile	3
Organizational Unit	2
Organization	1
ITIM Profile	1

## Phase 1

Phase 1 consists of the duration of test where we create a configuration of ISIM Directory server in the ISIQ. The ISIQ creates the ISIM topics and loads all the events from the ISIM Directory server into the topics. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

Topic	Completion Time (sec)	No. of Events
admin.isim.directory.Person	751	301,014
admin.isim.directory.ITIMAccount	457	226,014
admin.isim.directory.LdapAccount	267	150,004
admin.isim.directory.DefaultRole	0	5
admin.isim.directory.ITIMGroup	0	5
admin.isim.directory.LdapProfile	0	3
admin.isim.directory.OrganizationalUnit	0	2
admin.isim.directory.Organization	0	1
admin.isim.directory.ITIMProfile	0	1

### Phase 1 Throughput Calculation

Total Number of Events	Total Completion Time (sec)	Throughput
677,049	754	897.94 events/sec

## Phase 2

Phase 2 of the test execution consists of the duration of the test where we create a IGI product in ISIQ and subscribe ISIM product to it. and it loads the data from ISIM topics to its IGI topics. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

Topic	Completion Time (sec)	No. of Events
admin.igi.IGI_database.ACOUNT	27	376,018
admin.igi.IGI_database.USER_ERC	28	301,014
admin.igi.IGI_database.SERVICE_GROUP	0	5
admin.igi.IGI_database.ROLE	1	5
admin.igi.IGI_database.SERVICE	0	4
admin.igi.IGI_database.OU_ERC	1	3

### Phase 2 Throughput Calculation

Total Number of Events	Total Completion Time (sec)	Throughput
677,049	29	23,346.52 events/sec

## Phase 3

Phase 3 of the test includes the period of the test where ISIQ pushes all the data into the IGI application and it shows up in the Target queue. During this test run, following

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were the details about the topics created and the amount of time it took to load all the topics with the data:

<b>Queue</b>	<b>Completion Time (sec)</b>	<b>No. of Events</b>
In Org. Unit events	5	3
In User events	106291	301,713
Target Inbound -Access events	10	10
Target Inbound -Account events	136241	677,463

### Phase 3 Throughput Calculation

<b>Queue</b>	<b>Total Number of Events</b>	<b>Total Completion Time (sec)</b>	<b>Throughput</b>
In User Events	301,713	106291	2.84 events/sec
Target Inbound -Account events	677,463	136241	5.00 events/sec

### Phase 4

The fourth and final phase of the test is when the IGI application pushes the events to its Out Queue. During this test run, following were the details about the topics created and the amount of time it took to load all the topics with the data:

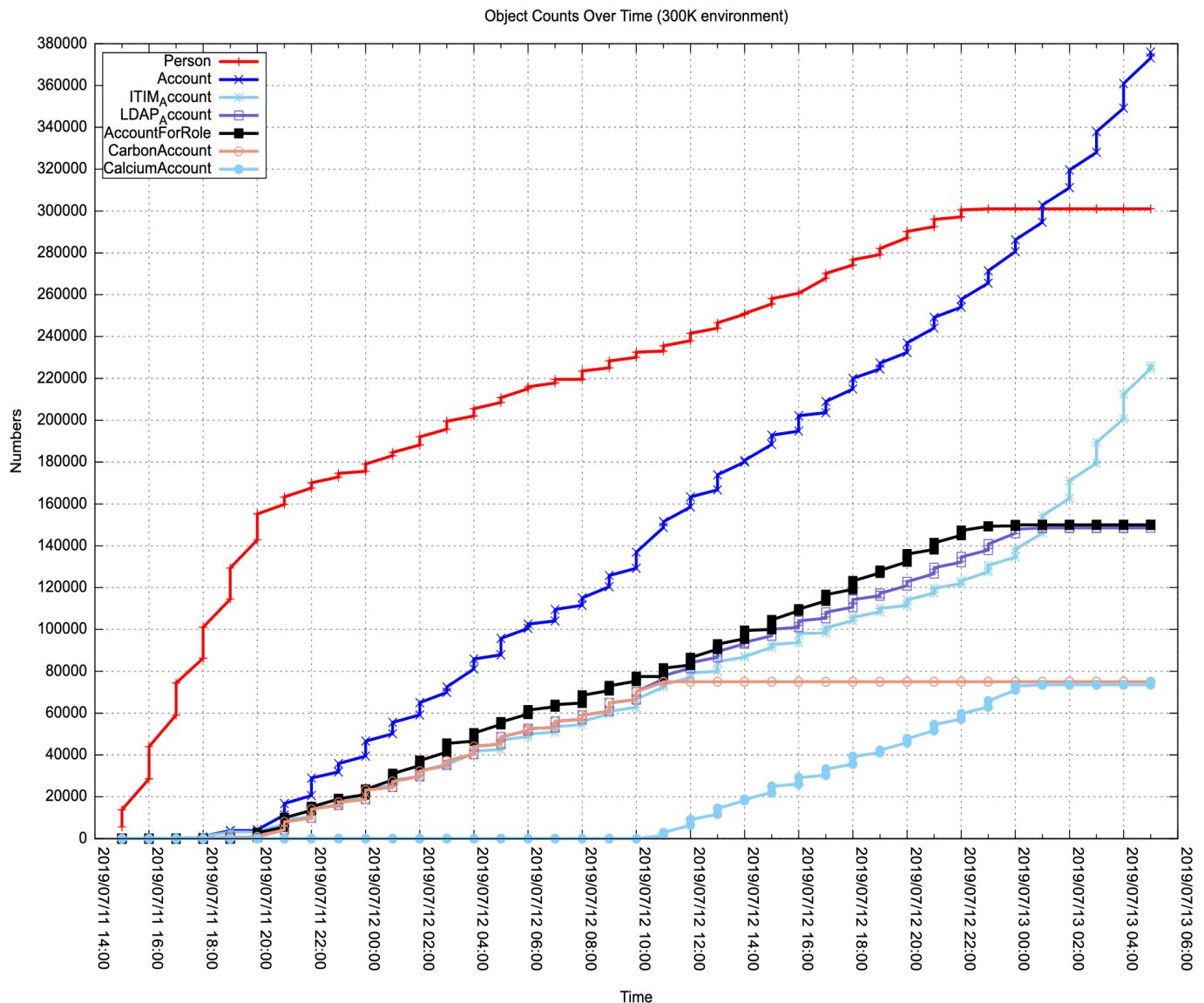
<b>Queue</b>	<b>Completion Time (sec)</b>	<b>No. of Events</b>
Out Events	136264	676,740

### Phase 4 Throughput Calculation

<b>Queue</b>	<b>Total Number of Events</b>	<b>Completion Time</b>	<b>Throughput</b>
Out Events	676,740	136264	4.97 events/sec

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## Object Count Over Time



## Delta Scenarios

After ISIQ pushes all the objects from ISIM into IGI, the initial load scenario comes to the conclusion. Once the initial load is completed various activities were performed in ISIM or IGI such as add users, add account, add entitlement to user, delete users, delete accounts, and delete entitlement from the user individually. Delta scenario is considered when the initial load is complete, and additional activities were performed either in ISIM or IGI.

## ISIM to IGI Delta Scenarios

### Add 300k Users Delta Scenario

After the initial load scenario from ISIM to IGI is complete, 300k users are added in ISIM using the DSML feed entry. As the users are created in ISIM, the objects are added into the ISIQ topics and eventually transferred into IGI. The report is divided into 4 phases as follows:

#### Phase 1

The test execution starts with creating DSML feed entry in ISIM. Phase 1 of the test execution is the Completion Time to complete the DSML feed entry process and create users in ISIM. The following table shows the Completion Time to complete the DSML feed entry process and create users in ISIM

Event	Total Number of Events	Completion Time (sec)	Throughput
ISIM	300,000	20990	14.29 events/sec

#### Phase 2

Phase 2 of the test execution consists of the duration of the test where the users created in Phase 1 transfers into the ISIM related topic in ISIQ. The following table show the Completion Time to load the events into the ISIM related topic isim.directory.Person in ISIQ

Topic	Total Number of Events	Completion Time (sec)	Throughput
isim.directory.Person	300,005	20931	14.33 events/sec

#### Phase 3

During phase 3 the events from ISIM related topic in ISIQ isim.directory.Person is transferred into IGI related topic in ISIQ, IGI\_database.USER\_ERC. The following table show the Completion Time to load the events into the ISIM related topic IGI\_database.USER\_ERC in ISIQ

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<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI_database.USER_ERC	300,005	20931	14.33 events/sec

### **Phase 4**

During phase 4 the events in the IGI Related topics in ISIQ IGI\_database.USER\_ERC is transferred into IGI, in the In-User events queue in as Create User event. The following table show the Completion Time to load the In-User events in IGI

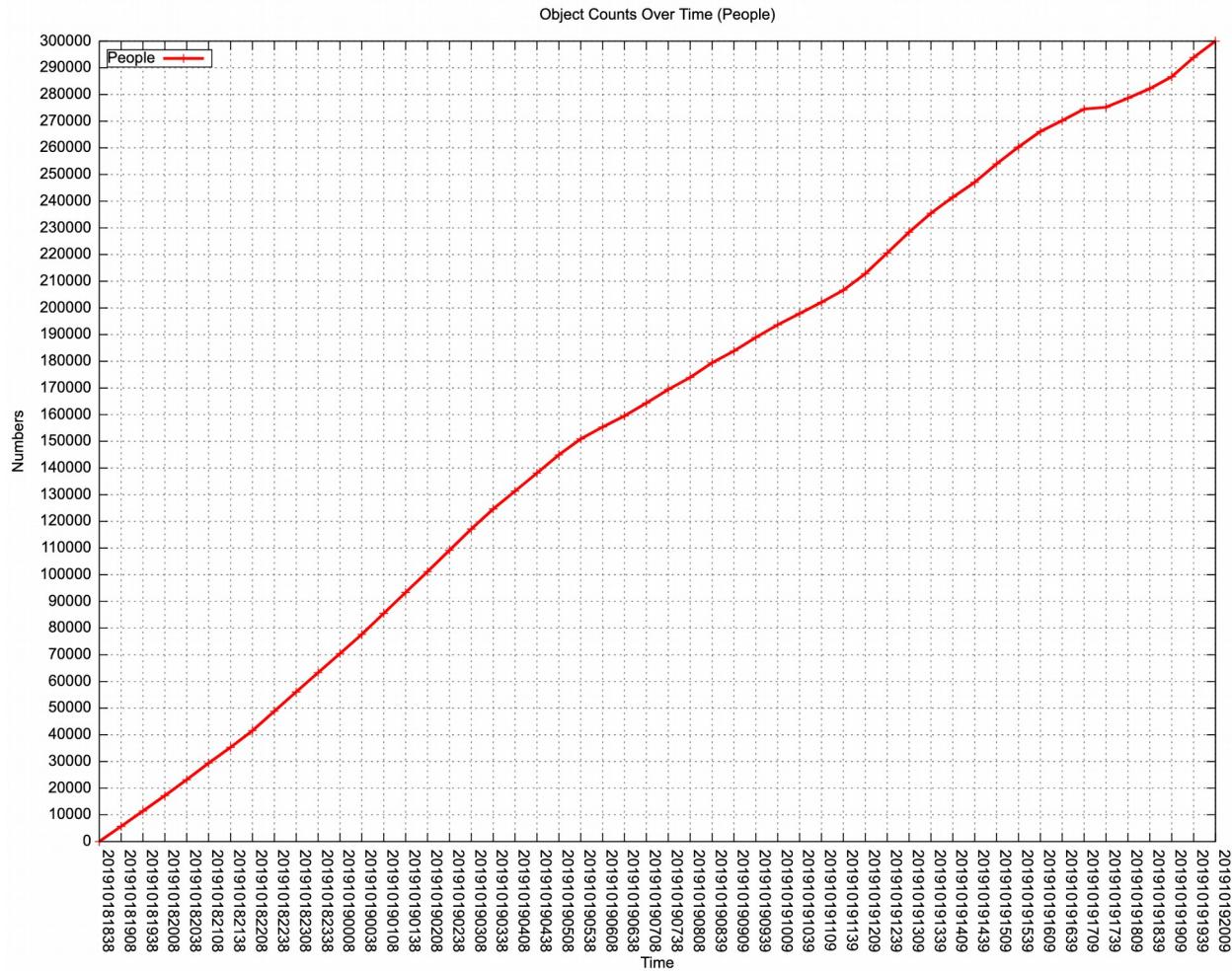
<b>Queue</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
In User Events	300,005	20938	14.33 events/sec

Even though it took 11450 seconds to load the events in the In-User events in IGI, the events were in the unprocessed state. IGI took 71863 seconds to process all the events. The actual processed throughput is shown in the table below

<b>Queue</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
In User Events	300,018	91610	3.27 events/sec

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### Object Count Over Time



### Add 300k Entitlement Delta Scenario

After the initial load is complete, a new dynamic role is created in ISIM with the rule to provision 300k users to the newly created role. As the role is being assigned to that 300k users in ISIM, ISIQ picks up the changes and sends it across to IGI, where the new entitlement coming from ISIM is created and the users are assigned to that entitlement. The test execution is divided into 5 different phases as follows:

#### Phase 1

The test execution starts with creating a new dynamic role in ISIM with the rule to provision 300k users to the role. Phase 1 consists of the total time it took for ISIM to assign the 300k users to the newly created dynamic role. The following table shows the total Completion Time to assign the 300k people to the role

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Event	Total Number of Events	Completion Time (sec)	Throughput
ISIM	300,000	3178	94.40 events/sec

### Phase 2

As the users are being assigned to the role in ISIM as shown in phase 1, those changes are picked up by ISIQ and are put into the ISIM related topic. Phase 2 consists of the Completion Time to load those events into the ISIM related topic in ISIQ. The following table shows the Completion Time to load the changes into the topic called `isim.directory.Person`:

Topic	Total Number of Events	Completion Time (sec)	Throughput
<code>isim.directory.Person</code>	300,000	3147	95.33 events/sec

### Phase 3

Since the test is performed after the initial load scenario is complete, the IGI is already subscribed to ISIM in ISIQ. So, as the events are loaded into ISIM topics, they are then transferred into the IGI related topic. Phase 3 is the process that occur in ISIQ where the events from ISIM related topic are transferred into IGI related topic. The following table show the Completion Time to transfer the events from ISIM related topic from phase 2 into the `IGI_database.USER_ERC` topic:

Topic	Total Number of Events	Completion Time (sec)	Throughput
<code>IGI_database.USER_ERC</code>	300,000	3147	95.33 events/sec

### Phase 4

As the events are getting loaded into the IGI related topics in phase 3, ISIQ transfers those events into IGI event queues, and IGI starts processing those events. Phase 4 is the duration it took to place those events in the IGI event queues. Following table shows the Completion Time to load those events for this test

Queue	Total Number of Events	Completion Time (sec)	Throughput
In User Events	300,000	4552	65.91 events/sec
Target Inbound -Account events	300,000	4552	65.91 events/sec

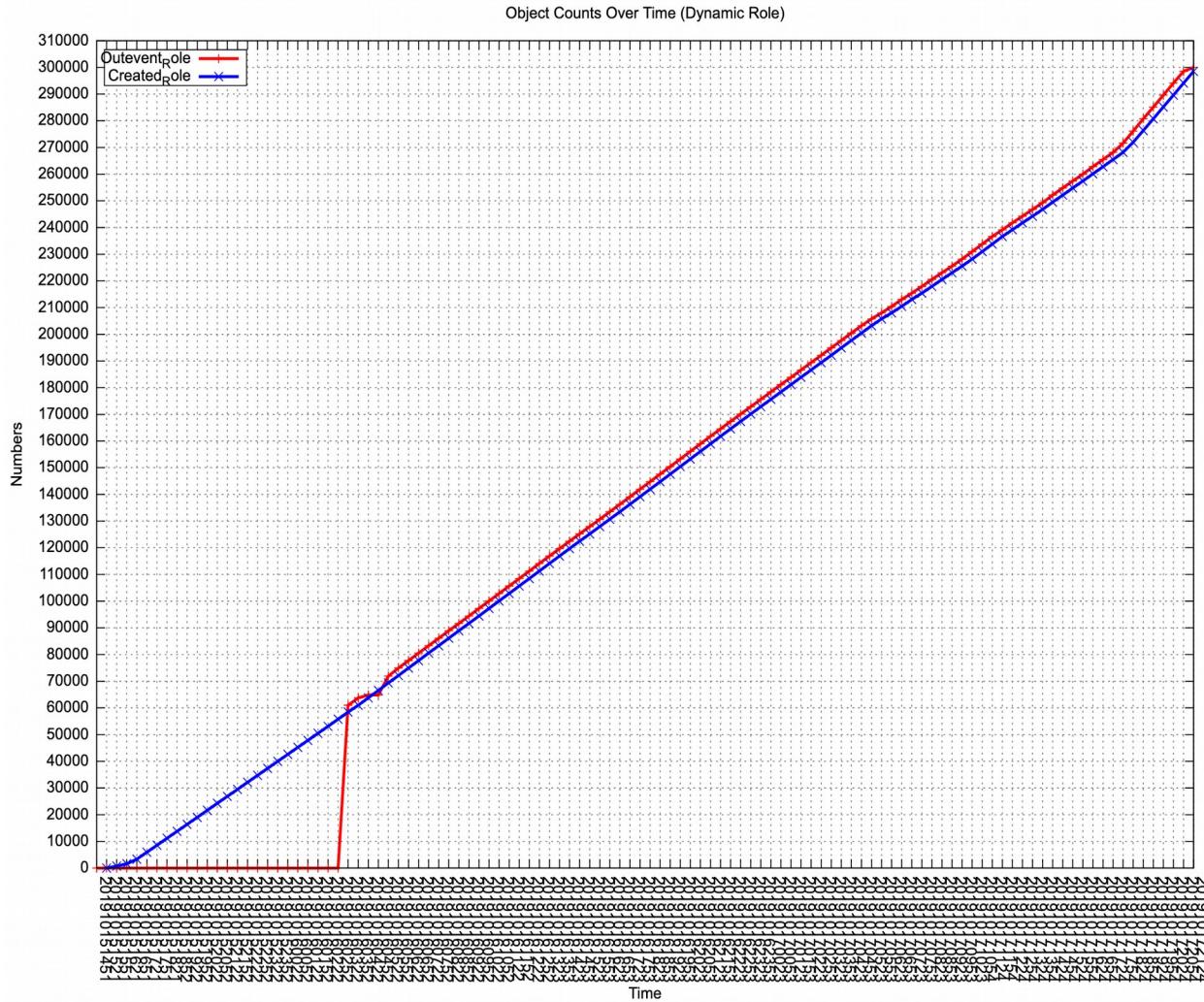
### Phase 5

Phase 5 of the test consists of the Completion Time to get the events from the event queues into Out Events queue in IGI. As the events in the event queues are processed by IGI, they are then transferred into IGI Out Events queue to get processed. The following table shows the Completion Time and throughput calculation for this phase:

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Queue	Total Number of Events	Completion Time (sec)	Throughput
Out Events	300,000	194701	1.54 events/sec

### Object Count Over Time



### Add 300k Account Delta Scenario

After the initial load scenario from ISIM to IGI is complete, 300k ISDS accounts are created in ISIM. It is done so by enforcing the provisioning policy so that the 300k users will get the ISDS accounts. As the accounts are getting created in ISIM, ISIQ picks up the new accounts and transfer them into IGI. The test execution is divided into 5 different phases as follows:

## Phase 1

After the initial load is complete, we create a new provisioning policy for the 300k users to get an ISDS Account each in ISIM. Phase 1 consists of the total time it took to create the 300k accounts by enforcing provisioning policy in ISIM. Following table shows the Completion Time and the throughput calculation:

Event	Total Number of Events	Completion Time (sec)	Throughput
ISIM	300,005	69945	4.29 events/sec

## Phase 2

As the events are getting processed on phase 1 in ISIM, those events are picked up by ISIQ and are put into the ISIM related topics. Phase 2 consists of the Completion Time to load those events into ISIM related topics in ISIQ. Following table shows the Completion Time and the throughput calculation:

Topic	Total Number of Events	Completion Time (sec)	Throughput
isim.directory.LdapAccount	300,005	69900	4.29 events/sec

## Phase 3

Since this test is performed after the initial load scenario, the IGI is already subscribed to ISIM in ISIQ. So, as the events are loaded into ISIM topics, they are then transferred into following IGI related topics. Phase 3 is the activity performed in ISIQ to transfer events from ISIM related topics into IGI related topics in ISIQ. Following table shows the Completion Time and the throughput calculation:

Topic	Total Number of Events	Completion Time (sec)	Throughput
IGI_database.ACOUNT	300,005	69900	4.29 events/sec

## Phase 4

As the data are getting loaded in the IGI related topics in ISIQ, ISIQ then transfers those data into IGI event queues to get processed in IGI. Phase 4 is the duration of time it took to place those events in the IGI event queues. Following table shows the Completion Time and the throughput calculation:

Target Queue	Total Number of Events	Completion Time (sec)	Throughput
Target Inbound -Account events	300,005	69900	4.29 events/sec

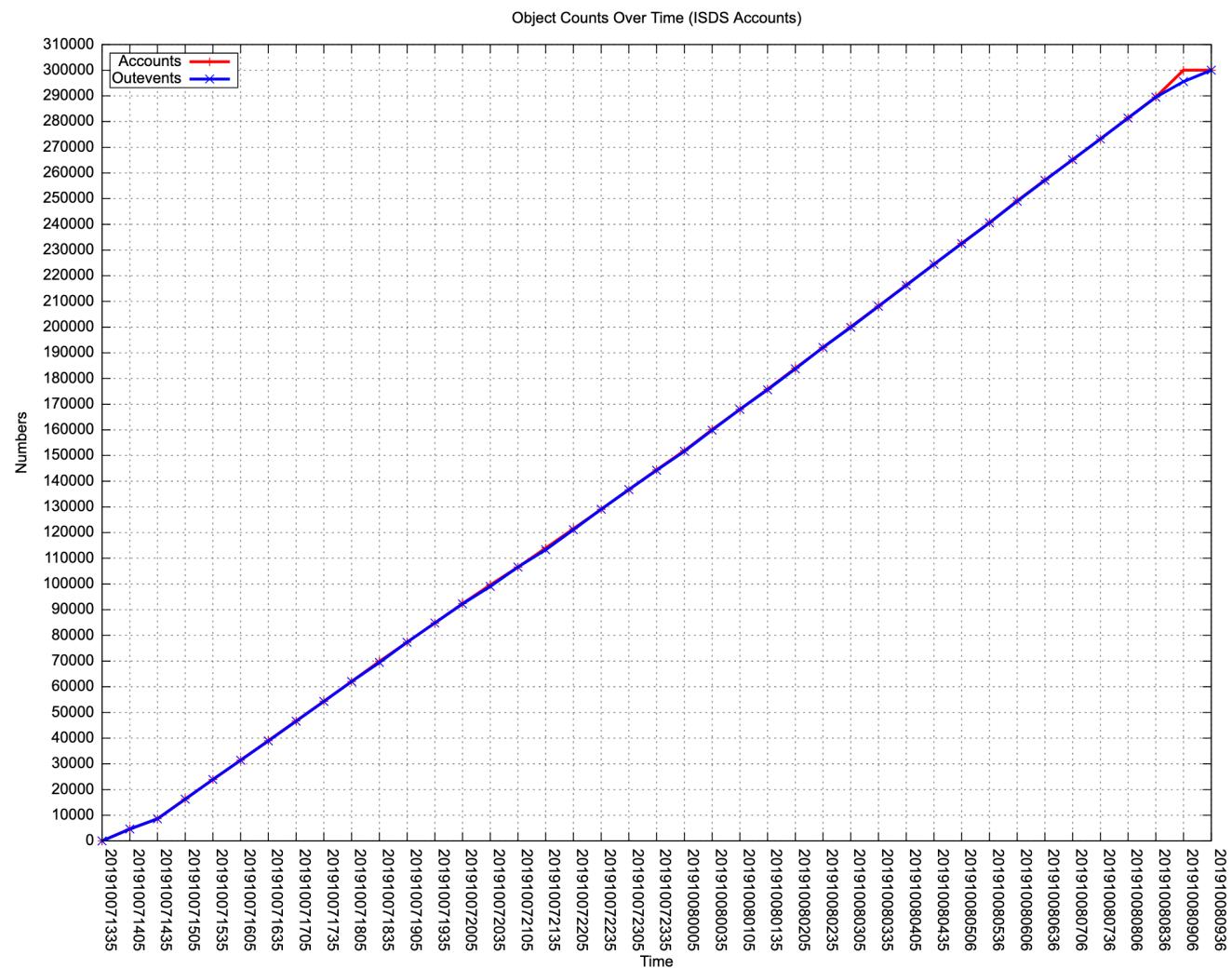
## IBM Security Information Queue Version 1.0.3 Performance Report

### Phase 5

Phase 5 of the test consists of the time it took to get the events from the event queues into Out Events queues in IGI. As the events in the events queues are processed by IGI, they are then transferred into IGI Out events queue to get processed. Following table shows the Completion Time and the throughput calculation:

Queue	Total Number of Events	Completion Time (sec)	Throughput
Out Events	300,005	69937	4.29 events/sec

### Object Count Over Time



## **IGI to ISIM Delta Scenarios**

As defined earlier in this document, ISIQ is a cross-product integrator that utilizes Kafka technology and a publish-subscribe model to integrate data between IBM® Security products such as IBM Security Identity Manager (ISIM) and IBM Security Identity Governance and Intelligence (IGI). So far this performance report concentrated towards the ISIM to IGI data transfers in the initial load scenario and the ISIM to IGI delta scenarios. ISIQ also allows the IGI to ISIM data integration.

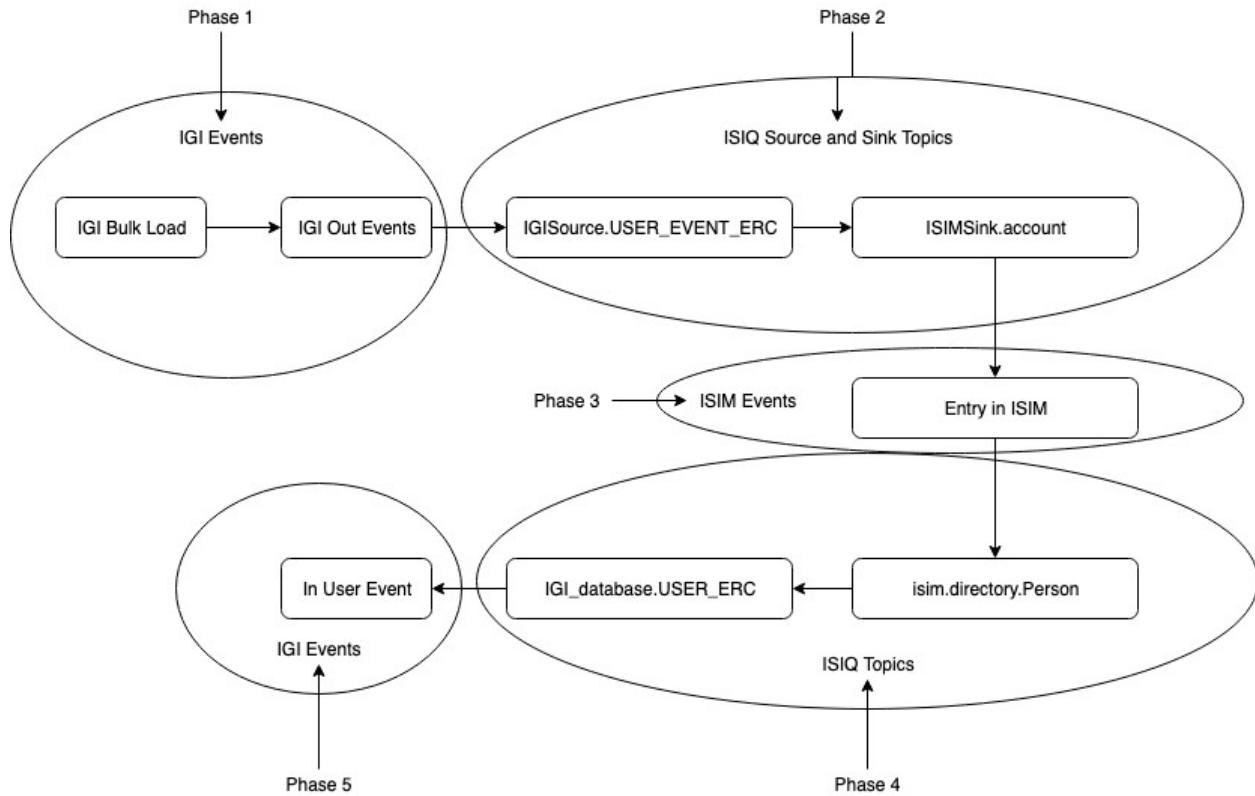
After the data is integrated into IGI from ISIM, organization can perform various activities in IGI such as Certification Campaigns, role mining, bulk load and etc., which may cause in the changes in the status of the users, their accounts and entitlements. It is essential feature that ISIQ provide that allows the IGI to ISIM data integration, so that any changes in the status in IGI is properly reflected in ISIM as well. The IGI to ISIM data integration feature (ISIQ\_IGItosIM\_FULFILL\_USER\_EVENTS) is set to false in the ISIQ starter kit. For the IGI to ISIM data integration to work, ISIQ needs to be deployed with the “ISIQ\_IGItosIM\_FULFILL\_USER\_EVENTS” value set to true on the connect-stack.yml:

- ISIQ\_IGItosIM\_FULFILL\_USER\_EVENTS=true

For the purpose of the performance testing the bulk load feature provided by IGI was utilized to perform the IGI to ISIM delta scenarios. While creating the spreadsheets for the bulk load it is essential that proper formatting is maintained per IGI bulk load requirement. It is recommended to the users to use the template spreadsheet provided by IGI for each of the bulk load action, under AGC -> Tools. In the laboratory environment, the IGI environment was empty, and all the data that are loaded into IGI is from ISIM to IGI data integration. Any changes made in IGI such as add entitlement, delete entitlement, add account, delete accounts are performed to the data that made its way to IGI from ISIM.

## Add 300k Entitlement Delta Scenario

After the initial load scenario from ISIM to IGI is complete, 300k users that came from ISIM were added to an existing entitlement that also came in from ISIM using the bulk load tool in IGI.



As shown in the image above the scenario is divided into 5 different phases. Each of the phase and the throughput calculation is explained below:

### Phase 1 (IGI)

Phase 1 of this scenario consists of 2 step process in IGI. First step is to assign 300k users to an entitlement using bulk load tool, and on the second step, IGI creates the events in the Out Events queue.

#### *Step 1 (IGI Bulk Load)*

The first step on phase 1, following steps were followed in order to add 300k users to an entitlement:

- Log in to IGI
- Click AGC -> Tools -> User-Ou-Entitlement Assignment
- On the right window click browse and Upload the selected spreadsheet.

The following table shows the Completion Time and the throughput calculation for this step:

Event	Total Number of Events	Completion Time (sec)	Throughput
IGI Bulk Load	300,000	30423	9.86 events/sec

### *Step 2 (Out events)*

As the bulk load is being processed, IGI creates the Add Permission events for each user assigned to the new entitlement in the Out Events Queue. The following table shows the Completion Time to create the events in the Out Events Queue, and the throughput calculations. This does not include the time it took to process those events:

Queue	Total Number of Events	Completion Time (sec)	Throughput
Out events	300,000	30383	9.87 events/sec

### *Phase 2 (ISIQ)*

When the events in the Out events queue are successfully processed by IGI as discussed in Phase 1 – step 2, ISIQ picks them up from the Out events queue, puts them in the IGI source topic and then transfer them the ISIM sink topic. This phase is also divided into 2 steps as follows:

#### *Step 1 (IGI Source Topic)*

As the IGI successfully processes the events in the Out events Queue, those events are then picked up by IGISource.USER\_EVENT\_ERC topics. Following table shows the Completion Time to load the IGISource.USER\_EVENT\_ERC topic, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
IGISource.USER_EVENT_ERC	300,000	31377	9.56 events/sec

#### *Step 2 (ISIM Sink Topic)*

As the events are loading in the IGISource.USER\_EVENT\_ERC in ISIQ, it is then transferred into ISIMSink.account topic. Following tables shows the Completion Time to load the ISIMSink.account topic, and the throughput calculation:

Topic	Total Number of Events	Completion Time (sec)	Throughput
ISIMSink.account	300,000	31301	9.58 events/sec

### *Phase 3 (ISIM)*

During this phase, the events in the ISIMSink.account sent to ISIM and is processed as the User Data Change event. The following table shows the Completion Time to transfer the events from ISIMSink.account topic in ISIQ into ISIM, and the throughput calculations:

Event	Total Number of Events	Completion Time (sec)	Throughput
User Data Change	300,000	46194	6.49 events/sec

## Phase 4 (ISIQ)

When the ISIM processes the User Data Change event, the person record is updated with the new entitlement, and because of this change in the person record, the ISIQ topic `isim.directory.Person` picks those events and sends it to `IGI_database.USER_ERC`. So we have divided this phase into 2 different steps, first is when the `isim.directory.Person` picks the events from ISIM, and second when the events are transferred to `IGI_database.USER_ERC`.

### Step 1

When the ISIM processes the User Data Change events, ISIQ captures the events and put them in the `isim.directory.Person` topics to send it back to IGI with the updated information for the user. Following table provides the detail about the Completion Time to load the `isim.directory.Person` topic, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
<code>isim.directory.Person</code>	300,001	46245	6.49 events/sec

### Step 2

As the events is being stored in the `isim.directory.Person`, the events is then transferred `IGI_database.USER_ERC` topic. Following table provides the detail about the Completion Time to load the `IGI_database.USER_ERC`, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
<code>IGI_database.USER_ERC</code>	300,001	46245	6.49 events/sec

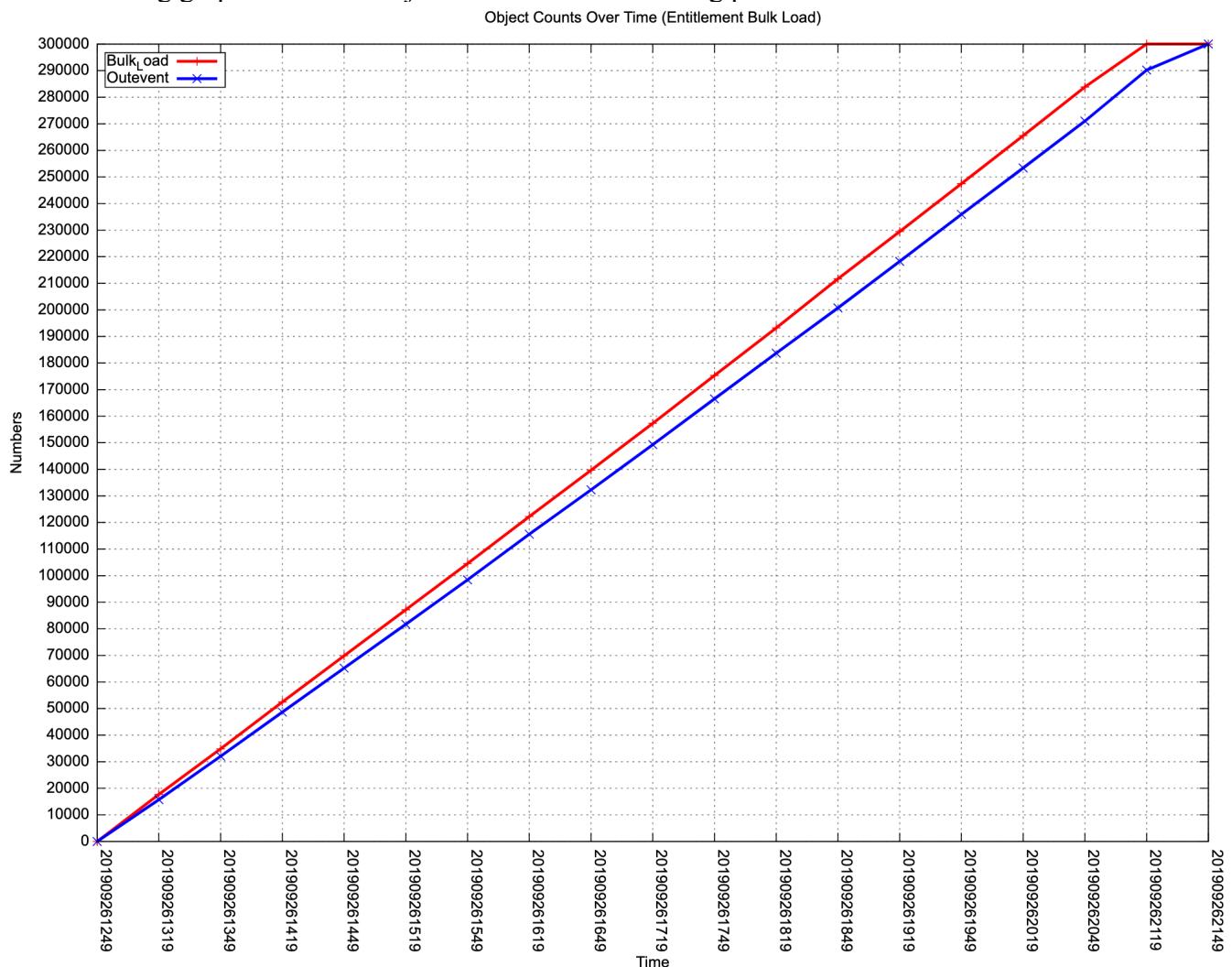
## Phase 5 (IGI)

The data from `IGI_database.USER_ERC` goes into IGI In User event queue as a Modify User event with the changes from ISIM. Following table shows the detail about the Completion Time to insert and process the data in IGI's In User events, and the throughput calculations.

Queue	Total Number of Events	Completion Time (sec)	Throughput
In User events (Modify User)	300,001	46253	6.49 events/sec

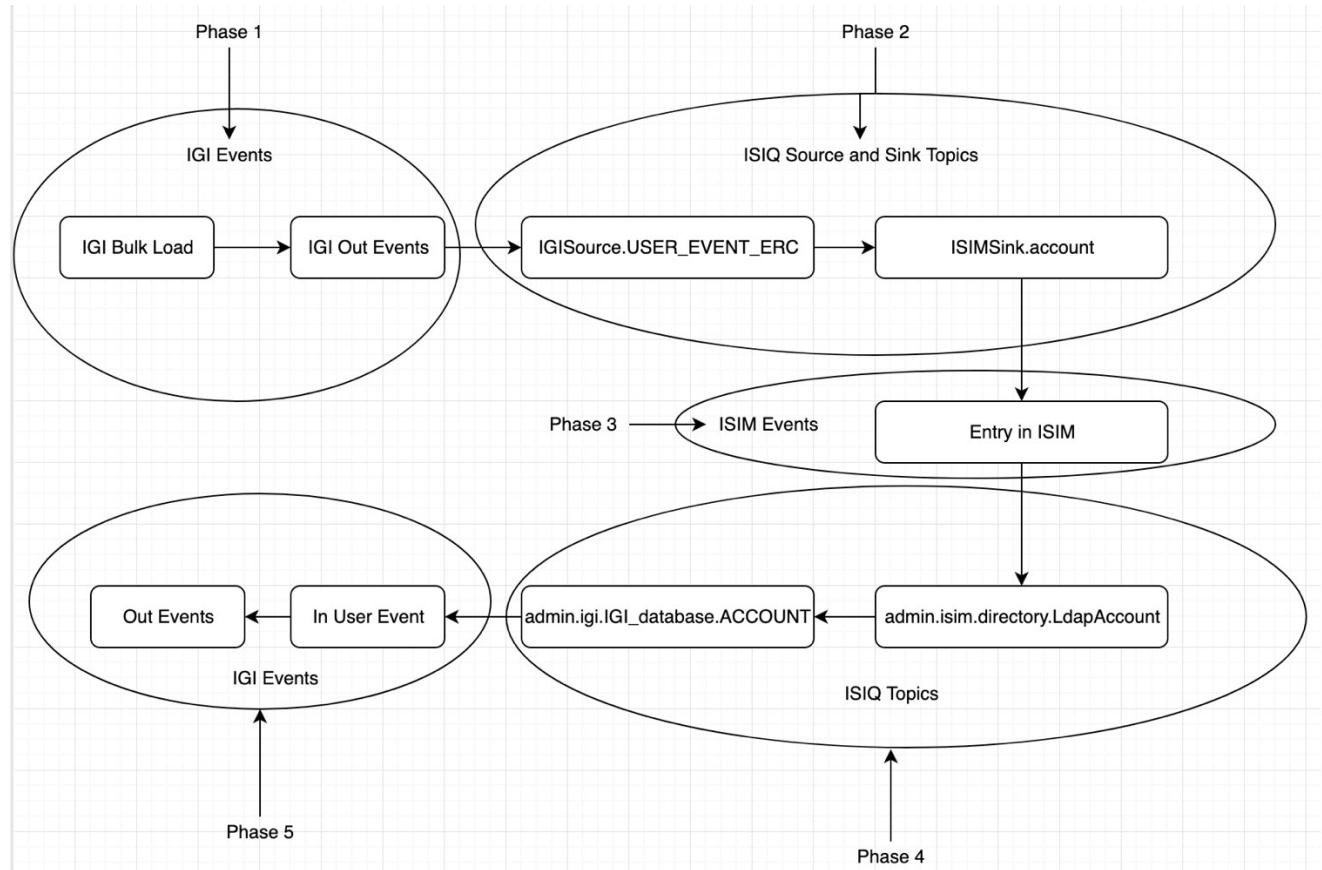
## Object Count Over Time

The following graph shows the object count over time during phase 1 as discussed above.



## Add 300k Accounts Delta Scenario

After the initial load is complete from ISIM to IGI, the 300k users that came from ISIM are added to an ISDS Account using the bulk load tool in IGI. The following image shows the graphical representation of the activities observed during this scenario:



As shown in the image above this scenario is divided into 5 phases. Each of the phase and the throughput calculation is explained below:

### Phase 1 (IGI)

Phase 1 of the test scenario consists of 2 steps. First step is to use the bulk load tool in IGI to assign the ISDS Accounts to the 300k users and on the second step, IGI creates the create account events in the Out Events queue.

#### *Step 1 (IGI Bulk Load)*

The first step of phase 1, the spreadsheet was uploaded to the bulk load tool in IGI with 300k accounts. The steps followed to add the spreadsheet are as follows:

- Log in to IGI
- Click AGC -> Tools -> Insert User Account Attributes
- On the right window click browse and upload the selected spreadsheet.

The following table shows the Completion Time and the throughput calculation for this step:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI Bulk Load	300,000	25336	11.84 events/sec

### *Step 2 (Out events)*

As the bulk load is being processed, IGI creates the Create Account event for each account created in the Out Events Queue. The following shows the Completion Time to create the account in the Out Events Queue, and the throughput calculations. This does not include the time it took to process those events:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI Out events	300,000	25316	11.85 events/sec

## Phase 2 (ISIQ)

Phase 2 consists of 2 steps, the first one is the events processed in the Step 2 of phase 1 to the IGISource.USER\_EVENT\_ERC topic, and the second one moving those events to the ISIMSSink.account topic in ISIQ. Each of the steps and throughput calculations are explained below

### *Step 1*

As the IGI successfully processes the events in the Out events Queue, those events are then picked up by IGISource.USER\_EVENT\_ERC topics. Following table shows the Completion Time to load the IGISource.USER\_EVENT\_ERC topic, and the throughput calculations:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGISource.USER_EVENT_ERC	300,000	32867	9.13 events/sec

### *Step 2*

As the events are loading in the IGISource.USER\_EVENT\_ERC in ISIQ, it is then transferred into ISIMSSink.account topic. Following tables shows the Completion Time to load the ISIMSSink.account topic, and the throughput calculation:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
ISIMSSink.account	300,000	32818	9.14 events/sec

### Phase 3 (ISIM)

During this phase, the events in the ISIMSink.account sent to ISIM and is processed as the Create Account event. The following table shows the Completion Time to transfer the events from ISIMSink.account topic in ISIQ into ISIM, and the throughput calculations:

Event	Total Number of Events	Completion Time (sec)	Throughput
Create Account	300,000	35185	8.53 events/sec

### Phase 4 (ISIQ)

When the ISIM processes the User Data Change event, the person record is updated with the new entitlement, and because of this change in the person record, the ISIQ topic isim.directory.LdapAccount picks those events and sends it to IGI\_database.ACCTOUNT. So we have divided this phase into 2 different steps, first is when the isim.directory.LdapAccount picks the events from ISIM, and second when the events are transferred to IGI\_database.ACCTOUNT.

#### *Step 1*

When the ISIM processes the User Data Change events, ISIQ captures the events and put them in the isim.directory.LdapAccount topics to send it back to IGI with the updated information for the user. Following table provides the detail about the Completion Time to load the isim.directory.LdapAccount topic, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
isim.directory.LdapAccount	300,000	35208	8.52 events/sec

#### *Step 2*

As the events is being stored in the isim.directory.LdapAccount, the events is then transferred IGI\_database.ACCTOUNT topic. Following table provides the detail about the Completion Time to load the IGI\_database.ACCTOUNT, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
IGI_database.ACCTOUNT	300,000	35208	8.52 events/sec

### Phase 5 (IGI)

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### *Step 1*

The data from IGI\_database.ACOUNT goes into IGI's Target Inbound -Account events queue as a Modify Account event with the changes from ISIM. Following table shows the detail about the Completion Time to insert and process the data in IGI's Target Inbound -Account events, and the throughput calculations.

<b>Target Queue</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
Target Inbound -Account Events	300,000	35208	8.52 events/sec

### *Step 2*

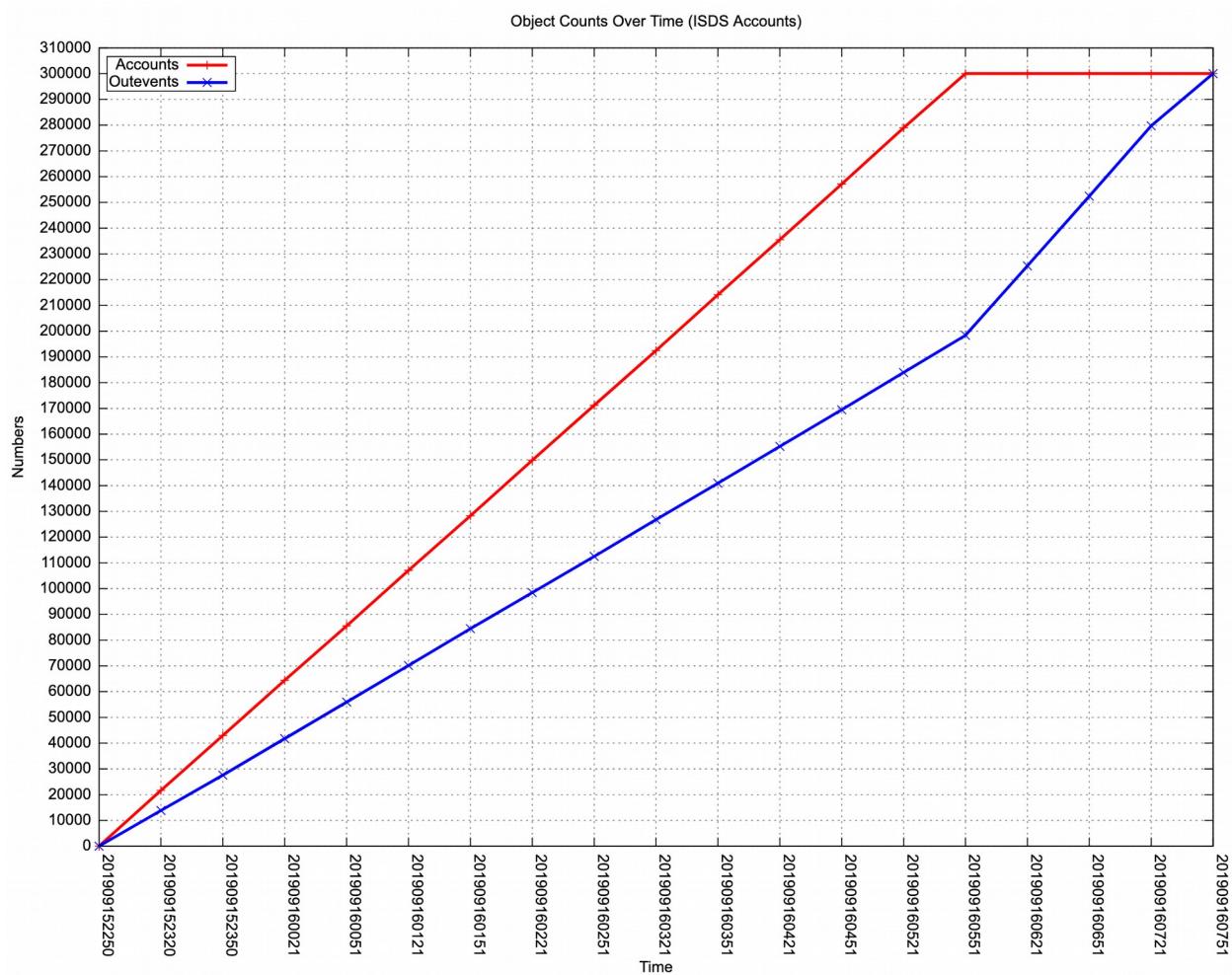
Once the events are processed from Target Inbound -Account events, the events go to the Out events Queue and get processed. The phase 5, step 2 is the duration in which the events are loaded in the Out events queue and are processed. Following table shows the detail about the Completion Time to insert and process the data in IGI's Out Event queue, and the throughput calculations.

<b>Target Queue</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
Out Events	300,000	105587	2.84 events/sec

### *Object Count Over Time*

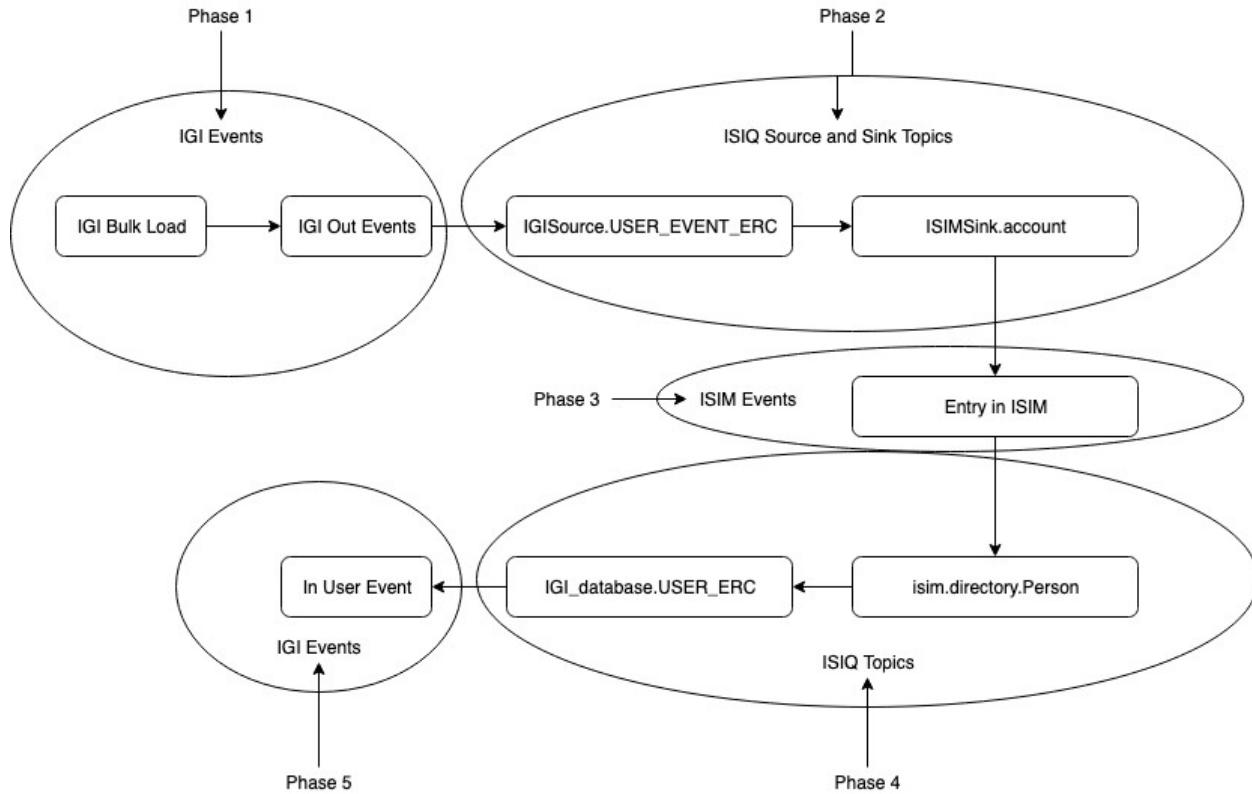
The following graph shows the object count over time during phase 1 as discussed above.

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## Delete 300k Entitlement Delta Scenario

After the initial load scenario from ISIM to IGI is complete, 300k users are deleted from an entitlement that came from ISIM using the bulk load tool in IGI. Following is the graphical representation of the activities observed during the run:



As shown in the image above this scenario is divided into 5 phases. Each of the phase and the throughput calculation is explained below:

### Phase 1 (IGI)

Phase 1 consists of 2 steps which are removing the entitlement using a bulk load and the IGI processing them in the Out events Queue. The steps and throughput calculations are as follows:

#### *Step 1*

The first step on phase 1, we uploaded the spreadsheet to the bulk load tool in IGI with the information 300k Users removing them to an entitlement. The steps we followed to add the spreadsheet is as follows:

- Log in to IGI
- Click AGC -> Tools -> Remove User-OU-Entitlement Assignment (On the left window)
- On the right window click browse and Upload the selected spreadsheet.

The following table shows the Completion Time and the throughput calculation for this step:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI Bulk Load	300,000	18884	15.89 events/sec

### *Step 2*

As the bulk load is being processed, IGI creates the Create Account and Add Permission events for each user assigned to the new role in the Out events Queue. The following shows the Completion Time to create the events in the Out Events Queue, and the throughput calculations. This does not include the time it took to process those events:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI Out events	300,000	18869	15.90 events/sec

### **Phase 2 (ISIQ)**

Phase 2 consists of 2 steps, the first one is the events processed in the Step 2 of phase 1 to the IGISource.USER\_EVENT\_ERC topic in ISIQ, and the second one moving those events to the ISIMSSink.account topic in ISIQ.

### *Step 1*

As the IGI successfully processes the events in the Out events Queue, those events are then picked up by IGISource.USER\_EVENT\_ERC topics. Following table shows the Completion Time to load the IGISource.USER\_EVENT\_ERC topic, and the throughput calculations:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGISource.USER_EVENT_ERC	300,000	30954	9.69 events/sec

### *Step 2*

As the events are loading in the IGISource.USER\_EVENT\_ERC in ISIQ, it is then transferred into ISIMSSink.account topic. Following tables shows the Completion Time to load the ISIMSSink.account topic, and the throughput calculation:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
ISIMSSink.account	300,000	30954	9.69 events/sec

### Phase 3 (ISIM)

During this phase, the events in the ISIMSink.account sent to ISIM and is processed as the User Data Change event. The following table shows the Completion Time to transfer the events from ISIMSink.account topic in ISIQ into ISIM, and the throughput calculations:

Event	Total Number of Events	Completion Time (sec)	Throughput
User Data Change	300,000	47053	6.38 events/sec

### Phase 4 (ISIQ)

When the ISIM processes the User Data Change event, an entitlement is removed from the person record, and because of this change in the person record, the ISIQ topic isim.directory.Person picks those events and sends it to IGI\_database.USER\_ERC. So Phase 5 is divided into 2 different steps, first is when the isim.directory.Person picks the events from ISIM, and second when the events are transferred to IGI\_database.USER\_ERC.

#### Step 1

When the ISIM processes the User Data Change events, ISIQ captures the events and put them in the isim.directory.Person topics to send it back to IGI with the updated information for the user. Following table provides the detail about the Completion Time to load the isim.directory.Person topic, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
isim.directory.Person	300,000	47037	6.38 events/sec

#### Step 2

As the events is being stored in the isim.directory.Person, the events is then transferred IGI\_database.USER\_ERC topic. Following table provides the detail about the Completion Time to load the IGI\_database.USER\_ERC, and the throughput calculations:

Topic	Total Number of Events	Completion Time (sec)	Throughput
IGI_database.USER_ERC	300,000	47037	6.38 events/sec

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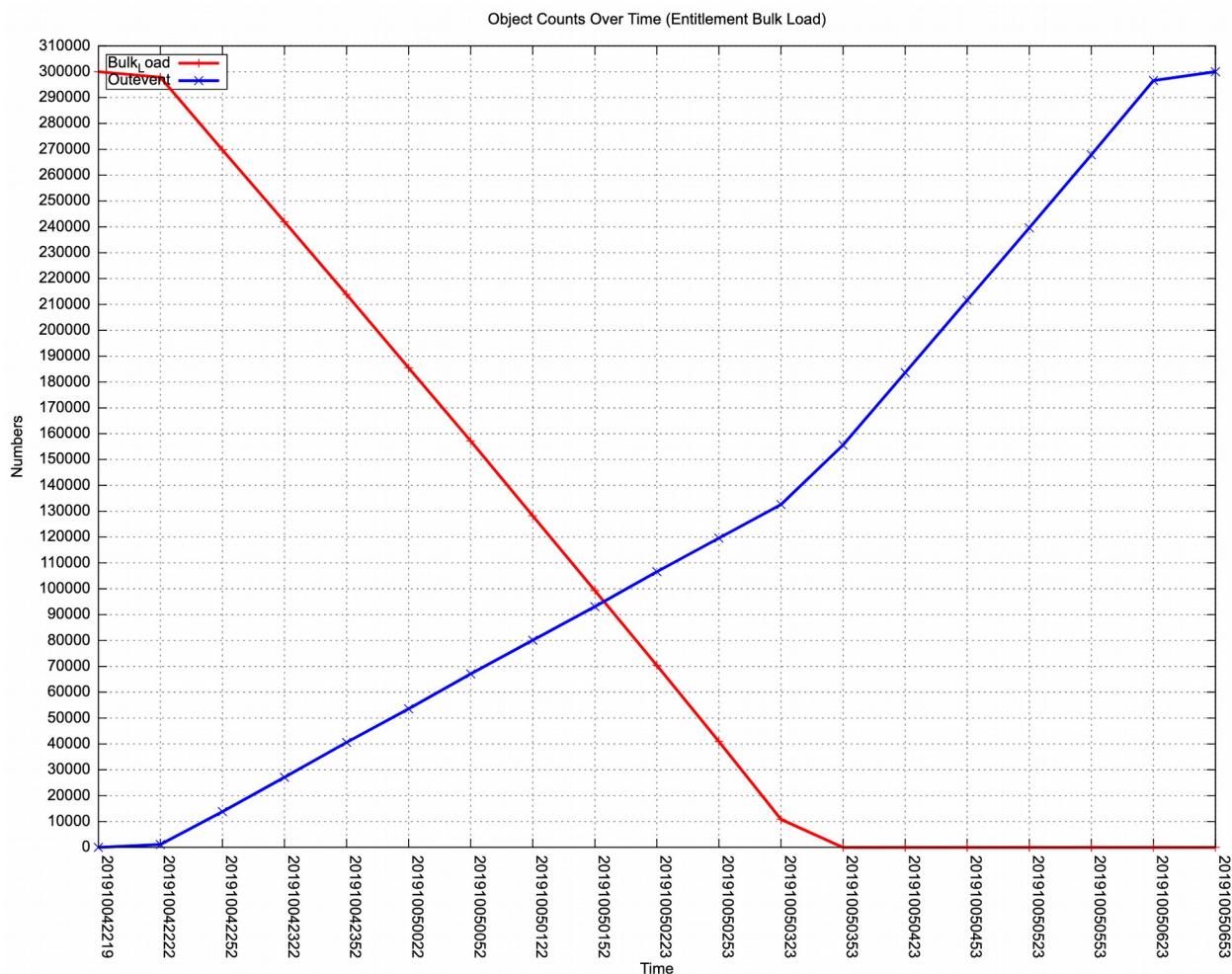
### Phase 5 (IGI)

The data from IGI\_database.USER\_ERC goes into IGI In User event queue as a Modify User event with the changes from ISIM. Following table shows the detail about the Completion Time to insert and process the data in IGI's In User events, and the throughput calculations.

Event	Total Number of Events	Completion Time (sec)	Throughput
In User Events	300,000	47042	6.38 events/sec

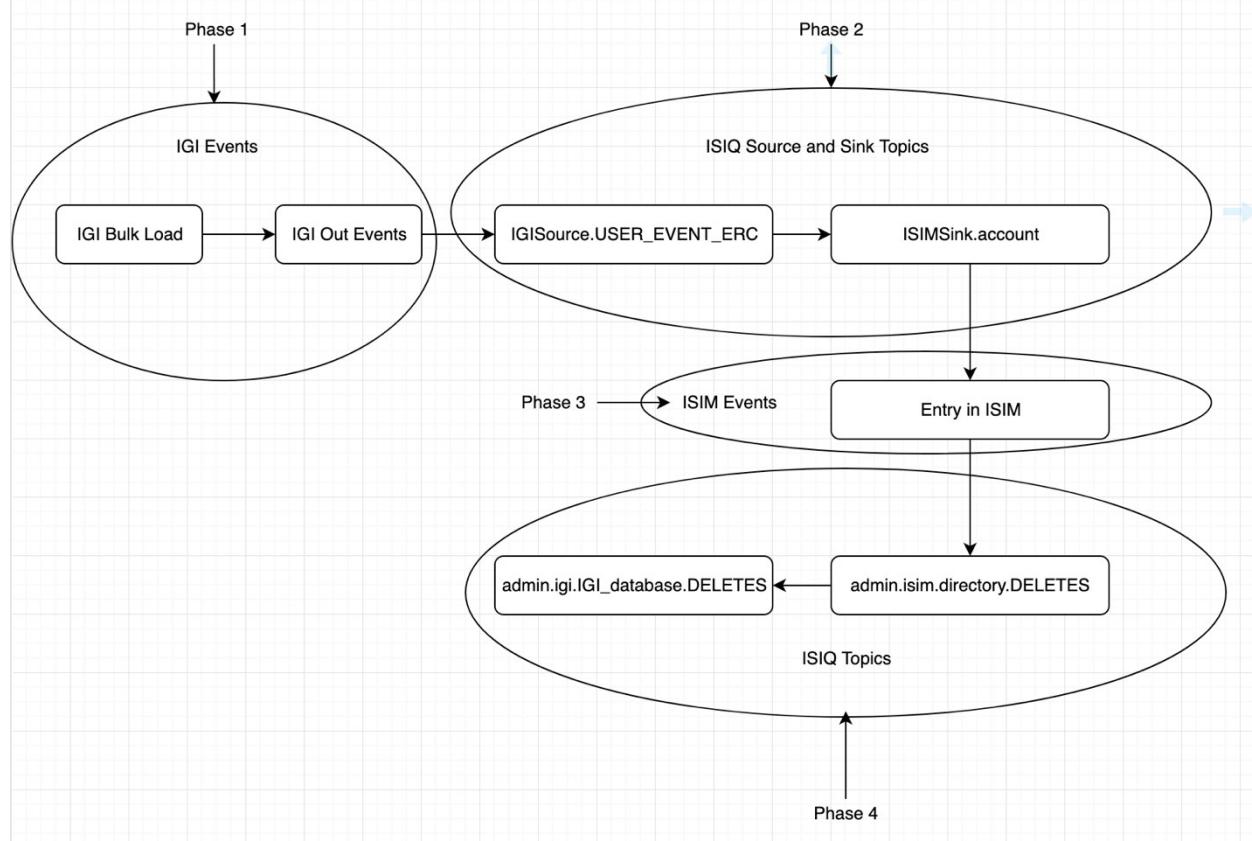
### Object Count Over Time

The following graph is observed in IGI during phase 1 of this scenario as discussed above:



## Delete 300k Account Delta Scenario

After the initial load is complete from ISIM to IGI, the 300k users that came from ISIM are removed from an ISDS Account using the bulk load tool in IGI. The following image shows the graphical representation of the activities observed during this scenario:



As shown in the image above this scenario is divided into 4 phases. Each of the phase and the throughput calculation is explained below:

### Phase 1 (IGI)

Phase 1 consists of 2 steps which are deleting the accounts using a bulk load and the IGI processing them in the Out events Queue.

#### *Step 1*

The first step on phase 1, the spreadsheet is uploaded to the bulk load tool in IGI with the information about the 300k accounts to be removed. The following steps were followed to add the spreadsheet to bulk load:

- Log in to IGI
- Click AGC -> Tools -> Remove User Account Attribute (on the left window)
- On the right window click browse and upload the selected spreadsheet.

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The following table shows the completion time and throughput calculation during this step:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI Bulk Load	300,000	6320	47.47 events/sec

### *Step 2*

As the bulk load is being processed, IGI creates the Delete Account event for each account deleted using bulk load in the Out events Queue. The following shows the Completion Time to create the events in the Out Events Queue, and the throughput calculations. This does not include the time it took to process those events:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI Out Events	300,000	7383	40.63 events/sec

## **Phase 2 (ISIQ)**

Phase 2 consists of 2 steps, the first one is the events processed in the Step 2 of phase 1 to the IGISource.USER\_EVENT\_ERC topic in ISIQ, and the second one moving those events to the ISIMSSink.account topic in ISIQ.

### *Step 1*

As the IGI successfully processes the events in the Out events Queue, those events are then picked up by IGISource.USER\_EVENT\_ERC topics. Following table shows the Completion Time to load the IGISource.USER\_EVENT\_ERC topic, and the throughput calculations:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGISource.USER_EVENT_ERC	300,000	23533	12.75 events/sec

### *Step 2*

As the events are loading in the IGISource.USER\_EVENT\_ERC in ISIQ, it is then transferred into ISIMSSink.account topic. Following tables shows the Completion Time to load the ISIMSSink.account topic, and the throughput calculation:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
ISIMSSink.account	300,000	23399	12.82 events/sec

## **Phase 3 (ISIM)**

During this phase, the events in the ISIMSSink.account sent to ISIM and is processed as the Delete Account event. The following table shows the Completion Time to transfer the events from ISIMSSink.account topic in ISIQ into ISIM, and the throughput calculations:

<b>Event</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
Delete Account	300,000	153118	1.96 events/sec

## Phase 4 (ISIQ)

When the ISIM processes the Delete Account event, the ISIQ picks up those changes/deletes and loads them as events in the topic isim.directory.DELETES. The events are then transferred from isim.directory.DELETES topic into IGI\_database.DELETES topic. Phase 4 consists of these two activities with in ISIQ. Following are the steps for phase 4.

### *Step 1*

When the ISIM processes the User Delete Account events, ISIQ captures the events and put them in the isim.directory.DELETES topics to send it back to IGI. Following table provides the detail about the Completion Time to load the isim.directory.DELETES topic, and the throughput calculations:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
isim.directory.DELETES	300,000	153239	1.96 events/sec

### *Step 2*

As the events is being stored in the isim.directory.DELETES, the events is then transferred IGI\_database.DELETES topic. Following table provides the detail about the Completion Time to load the IGI\_database.DELETES, and the throughput calculations:

<b>Topic</b>	<b>Total Number of Events</b>	<b>Completion Time (sec)</b>	<b>Throughput</b>
IGI_database.DELETES	300,000	153239	1.96 events/sec

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### Object Count Over Time

The following graph is observed in IGI during phase 1 of this scenario as discussed above:

