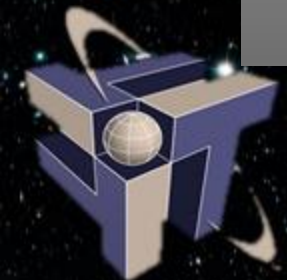




Maximo Proof of Concept Project: BigFix Data Import and Update

Jing Wang
IT-C2-Maximo Lab



I ❤️ Maximo



About Me

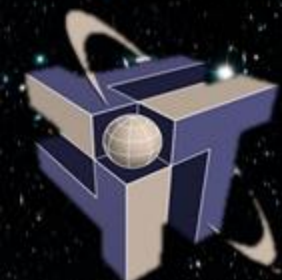
- US Army veteran
- Computer Engineering student at University of Central Florida
- Pathways Intern at Maximo Lab in IT-C2 since June, 2018
- Mentor: Jerry Barnes
- Projected graduation date: April 2021





IT-C2-Business Objectives of Agreement (BOA)

- The Application Services Division (IT-C2) is responsible for providing expertise, leadership, and guidance in software engineering (design, development, and software maintenance) for the entire life cycle of new and existing applications, services, and processes in accordance with NASA Software Engineering Requirements (NPR 7150.2). Efforts focus on marketplace researching, developing, activating, operating/sustaining, and managing application services products, tools, methods, and systems to meet present and future programmatic and institutional requirements.
- My role in the Maximo lab is to research and develop applications using Maximo to represent and visualize data.

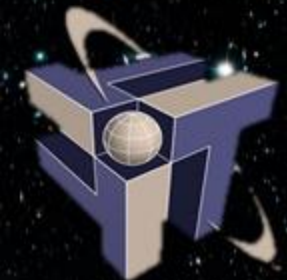




Goal

IBM Maximo is a web-based Computer Maintenance Management System (CMMS) solution. The goal of this Proof of Concept (POC) is to demonstrate Maximo's capability of managing large dataset. BigFix is one of the sources that produces large dataset with software installation information. This POC will produce multi-user access to the following software installation information:

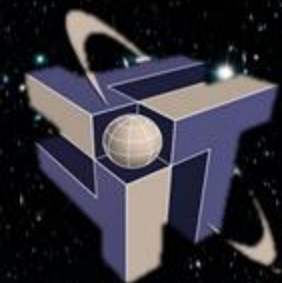
- Software installs
- Distribution by organizations
- Status changes and updates with a new data load
- Reports
- Alerts





New Application

- A new application “BigFix Data Management” was created to display and query the data.
- Any applications in Maximo can be duplicated and customized. Here I duplicated the out of box Maximo’s Asset application and configured it to match all the attributes that were needed from the BigFix data.
- BigFix data only provides Agency User ID (AUID), not the user’s name or organization, so a relationship was setup between the AUID from BigFix data and the personid from the People table (which is in sync with the database of all NASA users), in order to display the user’s name and organization.





BigFix Data Management

BigFix Data Management

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Find Asset

Advanced Search Save Query Bookmarks

Assets Filter 1 - 20 of 2626830

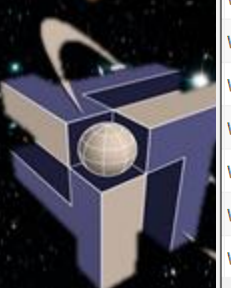
Asset	Status	Software Description	Software Version	Computer ID	Device Name	Operating System
5FC5AF8ABDA09BD2	Installed	Microsoft Visual C++ 2013 Redistributable (x86) - 12.0.40660	12.0.40660.0			Win10 10.0.17763.1
2FDE775BCDDA5CE7	Installed	Symantec Endpoint Encryption Client	11.1.1			Win10 10.0.17763.1
5491CE42D7C566D7	Installed	Symantec Endpoint Encryption Client	11.1.1 MP1			Win10 10.0.17763.1
EB5694370F164CE3	Installed	Cisco AnyConnect Secure Mobility Client	4.6.03049			Win10 10.0.17763.1
A3A6DC20C3480755	Installed	Haivision Helper	1.2.2.378			Win10 10.0.17763.1
A76F721898CF12C2	Installed	Adobe Acrobat Reader 2017 MUI	17.011.30166			Win10 10.0.17763.1
A72E9111125123DA	Installed	Cisco Jabber	12.6.1.34405			Win10 10.0.17763.1
98A042ACC84F5309	Installed	Java 8 Update 201	8.0.2010.9			Win10 10.0.17763.1
49BE03659583A487	Installed	Microsoft Visual C++ 2010 x64 Redistributable - 10.0.40219	10.0.40219			Win10 10.0.17763.1
101A4F8EA06B9B5F	Installed	Microsoft Visual C++ 2017 Redistributable (x64) - 14.11.25325	14.11.25325.0			Win10 10.0.17763.1
231A49347FD4B43B	Installed	Symantec Endpoint Protection	14.2.3335.1000			Win10 10.0.17763.1
94DDD67D58D594C6	Installed	Microsoft Visual C++ 2005 Redistributable	8.0.61001			Win10 10.0.17763.1
D325C33F12FD05A1	Installed	Microsoft Visual C++ 2013 Redistributable (x64) - 12.0.21005	12.0.21005.1			Win10 10.0.17763.1
6272A4C401DB32FA	Installed	PivManUndo	1.01.0003			Win10 10.0.17763.1
900E93E7D4E1D662	Installed	BeyondTrust Remote Support Virtual Smart Card Customer	1.1.9.1			Win10 10.0.17763.1
500CE76A1C20F038	Installed	Entrust Entelligence Security Provider 10.0 for Outlook	10.0.20.1465			Win10 10.0.17763.1
909C1465C04476FA	Installed	Microsoft OneDrive	18.111.0603.0006			Win10 10.0.17763.1
E90B6C57C66427C0	Installed	ActivID ActivClient x64	7.1.0			Win10 10.0.17763.1
5157C00CDEA970FE	Installed	Canon IJ Scan Utility	1.1.20.13			Win10 10.0.17763.1





BigFix Data Management (cont.)

BigFix Data Management							
Jing Wang							
Find Asset							
Operating System	AUID	Name	Department	Scan Date (ALN)	Scan Date	Publisher	Cores
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Microsoft Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Symantec Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Symantec Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Cisco Systems, Inc.	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Halvision Network Video, Inc.	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Adobe Systems Incorporated	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Cisco Systems, Inc	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Oracle Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Microsoft Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Microsoft Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Symantec Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Microsoft Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Microsoft Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		NASA ICAM Engineering	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		BeyondTrust Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Entrust, Inc.	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Microsoft Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		HID Global Corporation	4
Win10 10.0.17763.1158 (1809)			BA	05/04/2020 11:54:45.00		Canon Inc.	4





- Data querying using Where Clause

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BigFix Data Download

- Each set of data is about 2.5 million records.
- John Mccardle from IT-C2 wrote a process using Python to automate the data downloading and cleaning process.

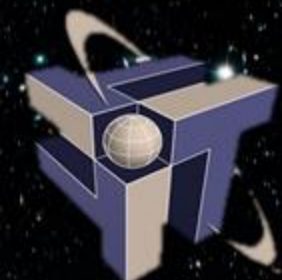
The image shows a Jupyter Notebook interface. The title bar reads 'jupyter Selenium for BigFix - Streamlined' with a 'Last Checkpoint: 05/04/2020 (autosaved)' and a 'Logout' button. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. The toolbar contains icons for file operations, a 'Run' button, and a 'Markdown' dropdown. The notebook content is titled 'Selenium for BigFix: The Streamlining Notebook'. It contains a paragraph about streamlining, a red instruction to follow all red text, a troubleshooting tip, and a 'Universal Settings' section with a code block for configuration. The code block is pre-formatted with comments and variable assignments.

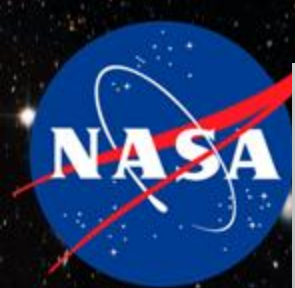
```
In [1]: # Disable data obfuscation by setting this to False
OBFUSCATE = True

# If this is set to "True", BigFix data will be downloaded, absolutely.
# If this is set to "False", BigFix data will only be downloaded if the download subdirectory is empty.
FORCE_REDOWNLOAD = True

##Number of reports
# Less reports means a faster download; but it can cause an error if any report is too large to download.
# More reports is more reliable, but hits BigFix more times for downloads and takes longer.
NUM_REPORTS = 30

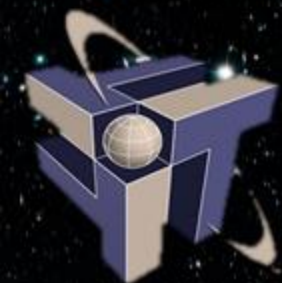
# Change this if you have a different preference.
BIGFIX_SUBFOLDER = r"Documents\BigFix"
```





BigFix Data Import via MIF

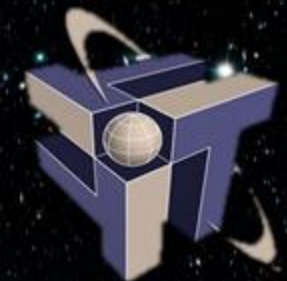
- MIF-Maximo Integration Framework, it is used to integrate application data with other applications, either within one system or with external systems.
- An interface table from MIF was setup to do the import
- A cron task was setup to check the interface table every 20 seconds to bring in the data
- Two holding tables were created in the database for the initial import and for future updates. This is to prevent any errors or interruptions before uploading to the interface table.
- The initial import to the first holding table is done in Oracle SQL Developer (database)
- They are then inserted to the interface table if there were no errors.





Monthly Data Update Process

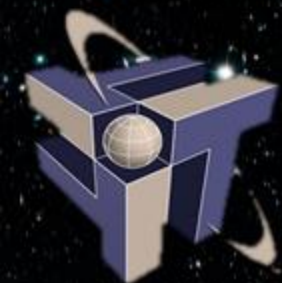
- The goal here is to capture the new software that needs to be validated, the old software that needs to be removed, and the software that's installed.
- Three statuses were used for updates:
 - Removed – when the record is in the previous dataset only (in Maximo and the second holding table)
 - Pending Validation – when the record is in the current dataset (the newly downloaded data in the first holding table)
 - Installed – when the record is in both the previous and current dataset





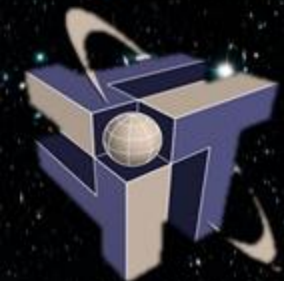
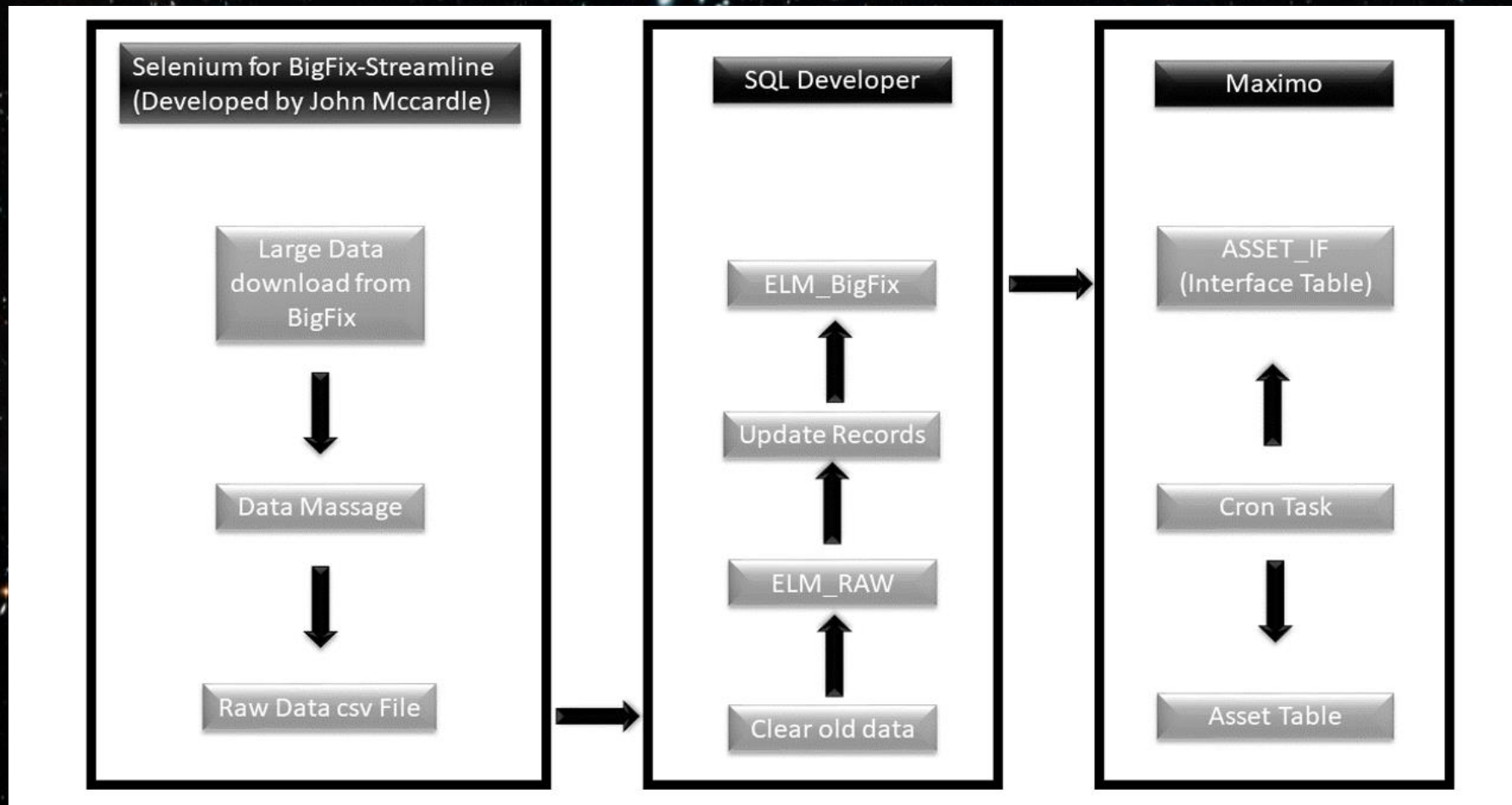
Monthly Data Update Process (cont.)

- All of the updates are done in SQL Developer
- Two holding tables are “ELM_RAW” and “ELM_BigFix”
- Clear out the old data that’s in holding table “ELM_RAW” where the data gets loaded into initially.
- Set all statuses to “Removed” in “ELM_BigFix” table.
- Software name, software version, computer ID and publisher fields were combined to identify a unique record. This was needed to match the unique IDs from the previous data so that they can be updated instead of being added as a new record.





Monthly Data Update Process (cont.)





Monthly Data Update Process (cont.)

- SQL developer

```
Welcome Page x Status_Update_Procedure.sql x
SQL Worksheet History
Worksheet Query Builder

--Create unique index on the four fields combined for faster searching.
CREATE UNIQUE INDEX "MAXIMO"."ELM_BigFix_NDX2" ON "MAXIMO"."ELM_BigFix" ("ELM_DATATYPE", "DESCRIPTION", "ELM_SOFTWAREVERSION",
"ELM_PUBLISHER") TABLESPACE MAXDATA

CREATE UNIQUE INDEX "MAXIMO"."ELM_RAW_NDX2" ON "MAXIMO"."ELM_RAW" ("ELM_DATATYPE", "DESCRIPTION", "ELM_SOFTWAREVERSION",
"ELM_PUBLISHER") TABLESPACE MAXDATA

--Also add unique index in the Asset table in Maximo, not here. Refer to the procedure.

--1.Clear the data that's in the RAW table
Truncate table ELM_RAW

commit

--2.Upload the data into the RAW table, refer to the BigFix Data Update Procedure.
--3.Change the software status to 'Removed' in the ASSET table and ELM_BigFix
update ASSET set ELM_SOFTWARESTATUS = 'Removed' where SITEID = 'KSC_LIC'
update "ELM_BigFix" set ELM_SOFTWARESTATUS = 'Removed'

commit

--4.Getting assetnums from the asset table for the RAW table if there's a match with the "four fields" combined
----also update the status to 'Installed' for being on both lists.

--No NULL values
UPDATE ELM_RAW
SET ASSETNUM = (SELECT ASSETNUM
FROM ASSET
WHERE siteid = 'KSC_LIC' AND
ASSET.ELM_DATATYPE = ELM_RAW.ELM_DATATYPE AND
ASSET.DESRIPTION = ELM_RAW.DESRIPTION AND
ASSET.ELM_SOFTWAREVERSION = ELM_RAW.ELM_SOFTWAREVERSION and
ASSET.ELM_PUBLISHER = ELM_RAW.ELM_PUBLISHER),
```

```
Welcome Page x Status_Update_Procedure.sql x
SQL Worksheet History
Worksheet Query Builder

WHERE siteid = 'KSC_LIC' AND
ASSET.ELM_DATATYPE = ELM_RAW.ELM_DATATYPE AND
ASSET.DESRIPTION = ELM_RAW.DESRIPTION AND
ASSET.ELM_SOFTWAREVERSION = ELM_RAW.ELM_SOFTWAREVERSION AND
ASSET.ELM_PUBLISHER IS NULL AND ELM_RAW.ELM_PUBLISHER IS NULL)

--NULL values in both ELM_SOFTWAREVERSION and ELM_PUBLISHER
UPDATE ELM_RAW
SET ASSETNUM = (SELECT ASSETNUM
FROM ASSET
WHERE siteid = 'KSC_LIC' AND
ASSET.ELM_DATATYPE = ELM_RAW.ELM_DATATYPE AND
ASSET.DESRIPTION = ELM_RAW.DESRIPTION AND
ASSET.ELM_SOFTWAREVERSION IS NULL and ELM_RAW.ELM_SOFTWAREVERSION IS NULL and
ASSET.ELM_PUBLISHER IS NULL AND ELM_RAW.ELM_PUBLISHER IS NULL),
elm_raw.ELM_SOFTWARESTATUS = 'Installed'
WHERE EXISTS (SELECT ASSETNUM
FROM ASSET
WHERE siteid = 'KSC_LIC' AND
ASSET.ELM_DATATYPE = ELM_RAW.ELM_DATATYPE AND
ASSET.DESRIPTION = ELM_RAW.DESRIPTION AND
ASSET.ELM_SOFTWAREVERSION IS NULL and ELM_RAW.ELM_SOFTWAREVERSION IS NULL and
ASSET.ELM_PUBLISHER IS NULL AND ELM_RAW.ELM_PUBLISHER IS NULL)

commit

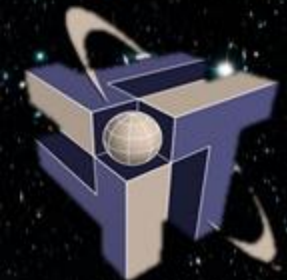
--5.When the record is in the RAW table, but not in the Asset table, update the status in the RAW table to "Pending Validation"
update ELM_RAW
set ELM_RAW."ELM_SOFTWARESTATUS" = 'Pending Validation'
Where not exists (select * from ASSET where ASSET.assetnum = ELM_RAW.assetnum AND SITEID = 'KSC_LIC')

commit
```



Monthly Data Update Process (cont.)

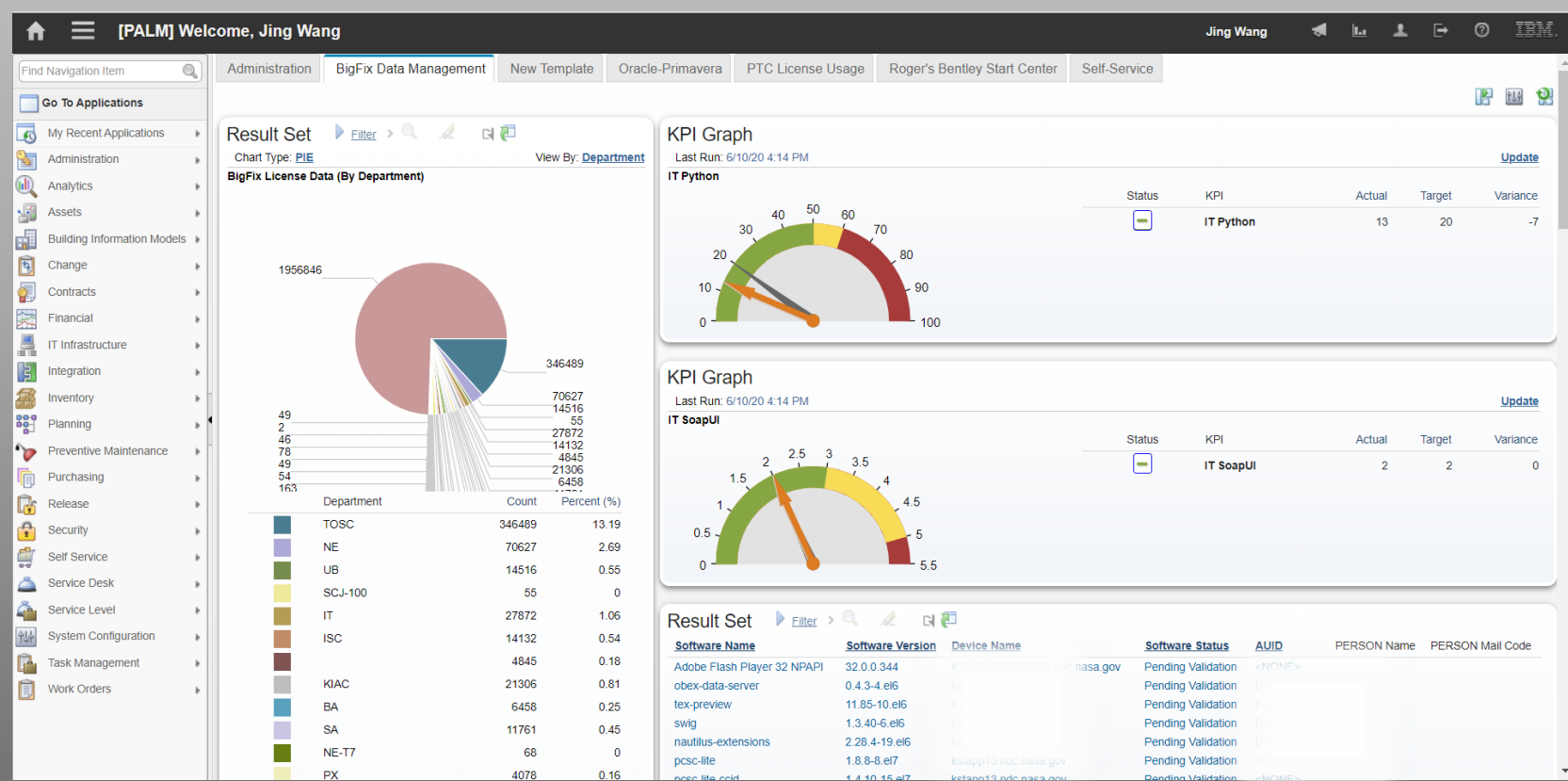
- Additional indexes were added to the holding tables to speed up the updating process due to the size of the data, however, that slowed down the importing speed.
- The updating process requires monitoring to ensure accuracy before inserting the final copy to the interface table, and once it's inserted into the interface table, the cron task checks it every 20 seconds, and that doesn't require any monitoring, so it was a reasonable trade off.





Reports

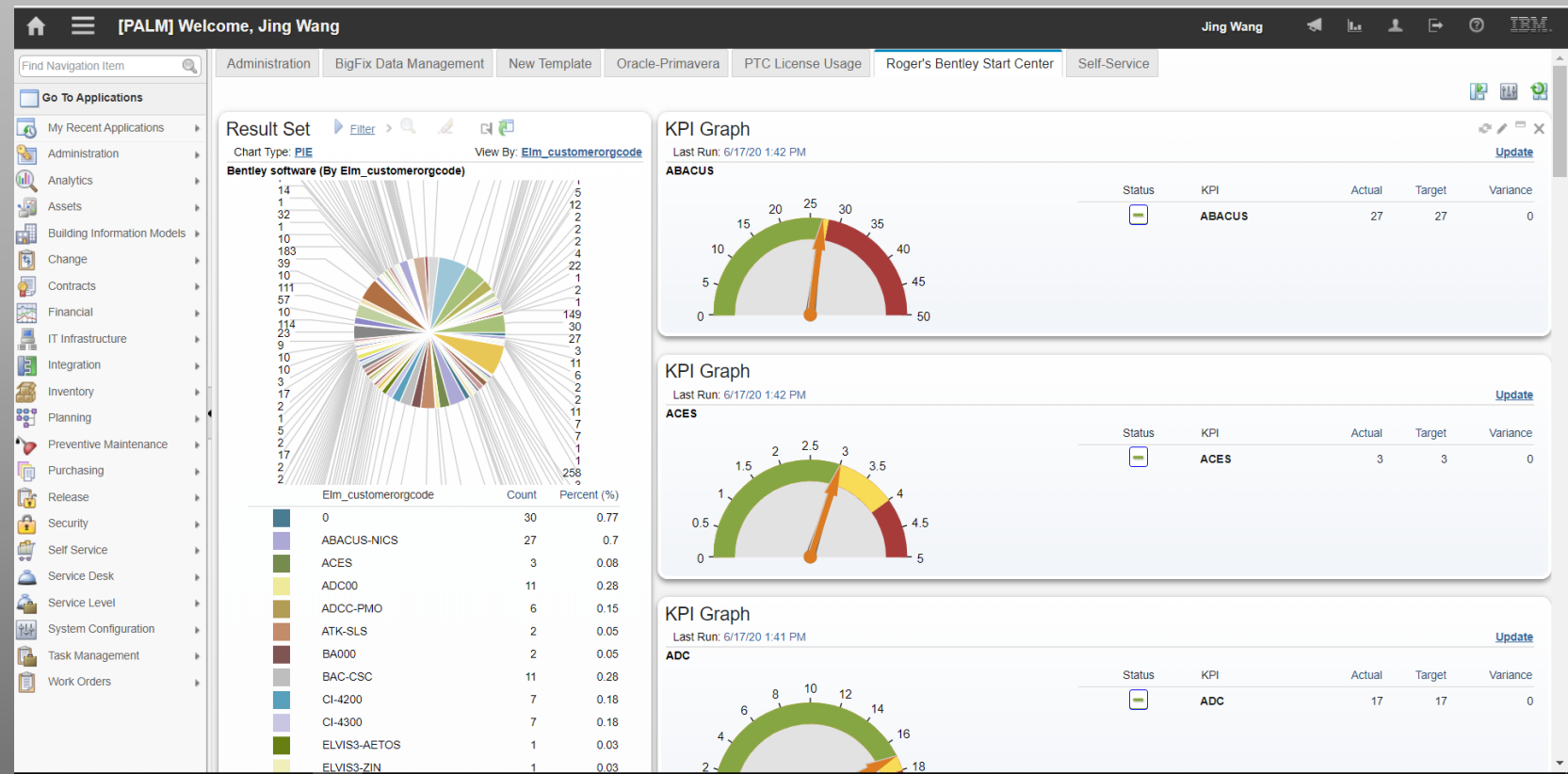
- Start center – gives a quick overview of different statuses





Reports

- Start center – for one software (Bentley)





Reports (cont.)

- KPIs (Key Performance Indicator) setup

List View

KPI

Historical Trends

Log

Security

KPI Name: KSC_IT

IT Python

Calculation Type: Decimal

Template:

Calculate Trend? ☒

Calculate Trend Size: 100

Calculate Trend Status: 0.000000000

Query Details

Select: select count (distinct elm_datatype) from asset join person on (elm_auid = personid)

Where: where (upper(siteid) = 'KSC_LIC') and (description like '%python%' and (person.addressline1 like 'IT%' or person.department like 'IT%'))

KPI Parameters

Target: 13.00

Is Active? ☒

Caution At: 13.00

Is Public? ☐

Alert At: 13.00

Created Date: 6/9/20 2:10 PM

Created By: JWANG39

Last Updated: 6/16/20 2:29 PM

Links

To link this KPI to another or to a Report select the corresponding link(s) by using the lookups.

Link to KPI:

Link to Report:

Graph Details

Last Run: 6/16/20 2:29 PM

Status	Actual	Last Reading	Target	Variance
IT Python	13	13	13	0





Reports (cont.)

- Escalation – to send alerts with personalized message

Find Escalation

Find Navigation Item

Go To Applications

Available Queries

All Records

All Bookmarks

Common Actions

New Escalation

Save Escalation

Clear Changes

More Actions

Validate

Activate/Deactivate Escalation

Duplicate Escalation

Delete Escalation

Add to Bookmarks

Applies To: KPIMAIN

Condition: kpiname = 'KSC_IT' and CAUTIONMIN > (select count (distinct elm_datatype) from asset join person on (elm_auid = personid))

Create Successful Execution Entry? ☐

Last Run Time:

Organization:

Schedule: 1d,0,0,9,*.*.*.*.*

Calendar Organization: >>

Calendar: >>

Shift: >>

Validation Results

Escalation Points

Escalation Point	Elapsed Time Attribute	Elapsed Time Interval	Interval Unit of Measure	Organization	Calendar	Shift
1						

New Row

Actions

Notifications

Notifications

Template	Role/Recipient	Subject
1020	MAXADMIN, jing.w.fredrickson@nasa.gov	CAUTION

Details

Template: 1020 >>

Role/Recipient: MAXADMIN, jing.w.fredrickson@nasa.gov

Subject: CAUTION

Message:
Font Size Format None
Your license usage reached the maximum value.



Reports (cont.)

- Result sets

Result Set [Filter](#)   

Software Name	Software Version	Device Name	Software Status	AUID	PERSON Name	PERSON Mail Code
xkeyboard-config	2.24-1.el7	...	Installed			
xml-common	0.6.3-39.el7	...	Installed			
xmlrpc-c	1.32.5-1905.svn2451.el7	...	Installed			
xmlrpc-c-client	1.32.5-1905.svn2451.el7	...	Installed			
xmlsec1	1.2.20-7.el7_4	...	Installed			
xmlsec1-openssl	1.2.20-7.el7_4	...	Installed			
xorg-x11-apps	7.7-7.el7	...	Installed			
xorg-x11-drivers	7.7-6.el7	...	Installed			
xorg-x11-drv-ati	19.0.1-2.el7	...	Installed			
xorg-x11-drv-dummy	0.3.7-1.el7.1	...	Installed			

[Set Chart Options](#) 1 - 10 of 2346262 [Next Page](#) >>

Result Set [Filter](#)   

Software Name	Software Version	Device Name	Software Status	AUID	PERSON Name	PERSON Mail Code
Microsoft OneDrive	19.222.1110.0006	...	Removed			
Google Chrome	81.0.4044.122	...	Removed			
Microsoft OneDrive	18.131.0701.0007	...	Removed			
Microsoft OneDrive	19.103.0527.0003	...	Removed			
Microsoft OneDrive	19.152.0927.0012	...	Removed			
AIX-rpm	7.2.3.15-21	...	Removed			
cups-lpd	1.5.4-1	...	Removed			
fontconfig	2.10.2-1	...	Removed			
gettext	0.19.8.1-3	...	Removed			
libglib2-0	2.60.3-1.el7	...	Removed			

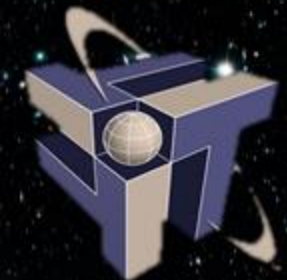
[Set Chart Options](#) 1 - 10 of 155226 [Next Page](#) >>





Milestones/Skills Developed

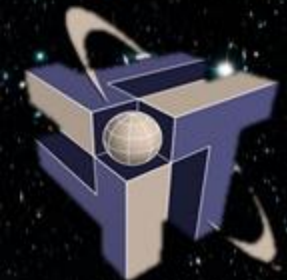
- Application design
- Database configuration
- Domain configuration
- Data import via MaxQuickLoad
- Data import via MIF
- Start center setup
- Result set configuration
- KPI configuration
- Escalation configuration
- System hierarchy configuration
- Web services and interactions within one system and between two systems





Significance of Work Experience

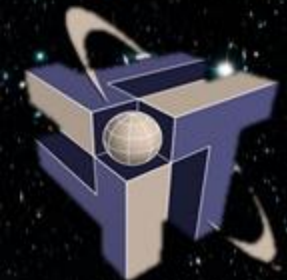
- It gave me an insight on how powerful Maximo is
- This could be a possible or part of solution to software license management
- I will be taking a database course this Fall semester, what I've learned hands on here will be extremely helpful.
- I had the opportunity to attend the Maximo World conference in Orlando, and it was an eye-opening experience. People from all over the world came together showcased how Maximo was used in their fields, which included a wide spectrum of different businesses.





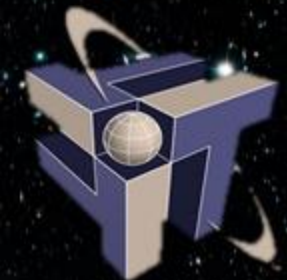
Acknowledgement

- I want to thank my mentor Jerry Barnes as well as my coworkers Neil Spears, John McCardle and AL Menendez for giving me all the support, guidance and patience throughout every project I've done.
- I want to thank the pathways office and my supervisor Tony Killiri for giving me this opportunity and working with me on my work/school schedule.
- I also want to thank everyone in IT-C2 for their support and kindness. I am beyond grateful to be here.





Questions?



I ❤️ Maximo