

LFS307

# AWS re:INVENT

## Using AWS to Maximize Digital Marketing Reach and Efficiency

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November 27, 2017

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Pharmaceutical company processes tend to be slow when dealing with customer-facing applications that contain FDA-validated messages, all while maintaining infrastructure and security standards. In this session, discover how Mylan, a US-based global generic and specialty pharmaceutical company, overcame these obstacles and provided scalable solutions by leveraging AWS DevOps methods that lower time to market, while maintaining robust security and release management practices. During the presentation, learn how Mylan redefined process models such as infrastructure change management to define new security and process models. Additionally, learn how Mylan used services like Amazon S3, Elastic Load Balancing (ELB), and AWS CloudFormation to define these new models.

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# AGENDA

About Mylan

Why?

How?

The Future!

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## ABOUT MYLAN

**At Mylan, we are committed to setting new standards in healthcare.**

Working together around the world to provide 7 billion people access to high quality medicine, we:

- Innovate to satisfy unmet needs
- Make reliability and service excellence a habit
- Do what is right, not what's easy
- Impact the future through passionate global leadership



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# Mylan a champion for better health

A GLOBAL  
WORKFORCE OF  
**>35,000**  
IN 65 COUNTRIES



PRODUCTS IN  
**>165**  
COUNTRIES &  
TERRITORIES

GLOBAL MARKET  
PORTFOLIO  
**>7,500**  
MARKETED  
PRODUCTS

**1 OUT OF 13**  
PRESCRIPTIONS  
FILLED IN THE  
U.S. IS A MYLAN  
PRODUCT

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## AWS CLOUD



Most IT departments have a cloud strategy, but what does it really take to move to the cloud?

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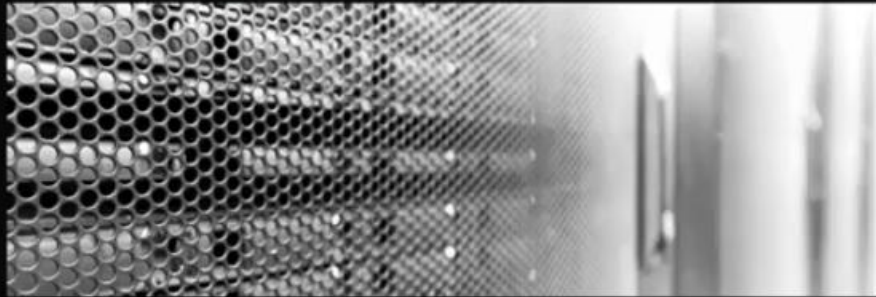
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# WHERE WE WERE

Co-located, monolithic, physical environment in a mid-west datacenter

- Dual firewalls
- Dual load balancers
- Dual WFE servers
- 100 MB internet connection
- SQL server database cluster



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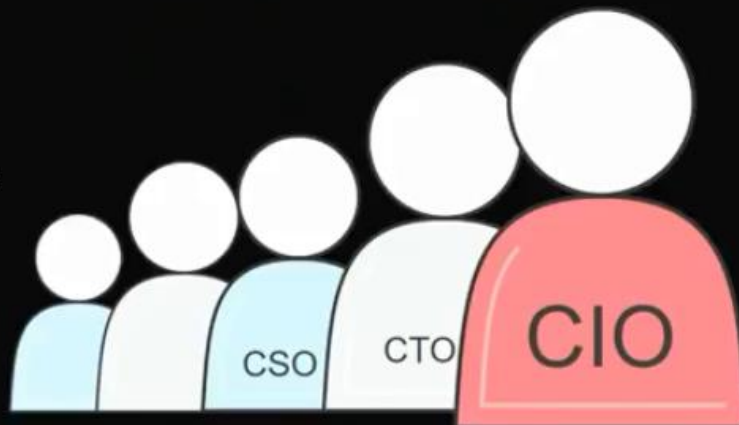
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## EVENT 1: Q1 2015 QUARTERLY CALL

### Quarterly Call War Room

- Still at our colo provider
- Call begins normally
- Typical traffic spike
- Sites become unresponsive
- Resolves itself 25 minutes later
- Cause: sustained network traffic over 100 MB



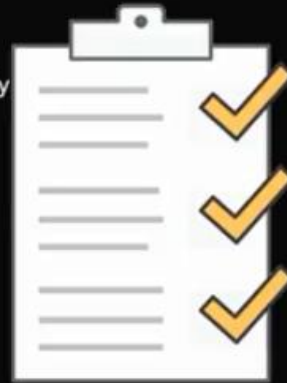
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# REQUIREMENTS

- Logging and visibility
- Automation
- Support requirements for audits by Quality, Regulatory, and Security
- Highly available and scalable environment
- Cost can be managed and optimized as we learn

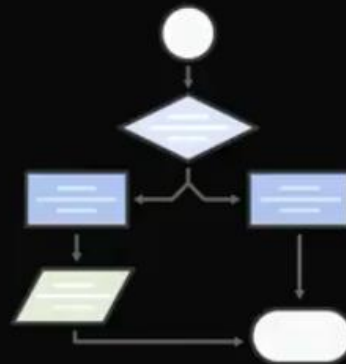


# QUALITY ASSURANCE

For Mylan, the Quality Assurance team ensures that digital infrastructure processes conform to good change management practices.

What was considered when moving into AWS?

- No personal health information (PHI)
- Infrastructure validated as non-GxP
- Separation of responsibility for areas
- Standard Operation Procedures (SOP)
- Focus on change management processes
- Source control and deployment processes



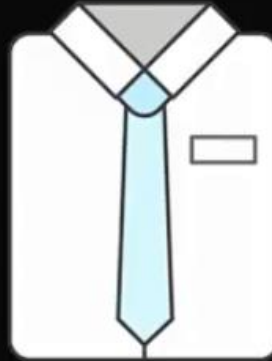


# REGULATORY & COMPLIANCE

For Mylan, the Regulatory team approves all customer-facing content on our web and mobile applications to ensure that it meets all legal requirements set by the various public governing organizations for accuracy, claims, and usage.

What was considered when moving into AWS?

- MARC process (Veeva Vault)
- Visibility into the lifecycle of content



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# SECURITY

For Mylan, the Security team advises on requirements, best practices, and testing of the security posture for infrastructure, systems, and applications.

What was considered when moving into AWS?

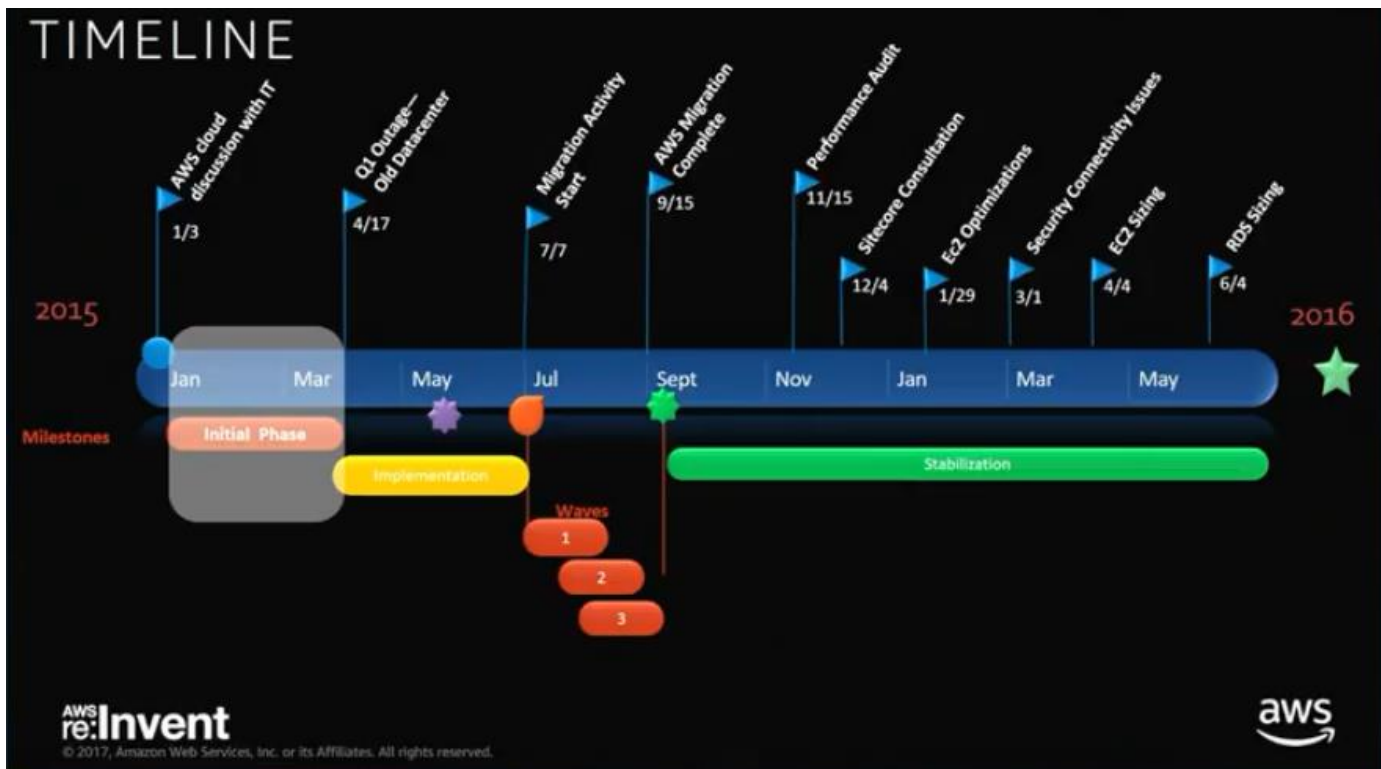
- Risk management
- Intrusion detection and prevention
- Virus detection



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We launched 60 different websites and then stabilized them over time in AWS, we are now serving over 160 websites in Mylar.

## STABILIZATION

Bootstrap process, config, code, deployment all "working" but experienced latency and outages at times

**AWS-related challenges:**

- RDS episodes of high number of connections
- Squid instances versus NAT service
- EC2 Win2k8 R2 AMI, disabled TCP offloading
- EC2ConfigService logging, terminal output versus PowerShell transaction logging

**Application-related challenges:**

- Sitecore analytics database connections
- Running commands across all servers
- Bringing EC2 instances into ELB pool before they are "ready"
- Managing permissions in S3 and locally on each EC2

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## EVENT 2: NEWS RELEASE

- Normal day of operations, no planned activities
- Received latency alerts
- AWS was already responding
- Visibility, reaction, control



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After a press release in the media, we saw a spike in traffic but this time AWS was scaling the ASG groups and we can see everything happening in real-time.

The Journey Not the Destination

## A Bit of the Tech

Mitchell Sapolio—Manager Digital Solutions

AWS Certified Solutions Architect—Associate

## SERVICES THAT WE USE

CIRCA 2014



Amazon  
EC2



AMI



Auto Scaling



Elastic Load  
Balancing



Amazon  
CloudFront



Amazon  
Route 53



Amazon  
SES



Amazon  
SNS



Amazon  
RDS



Amazon  
S3



Amazon EBS



IAM



Amazon  
CloudWatch



AWS  
CloudFormation



AWS  
CloudTrail

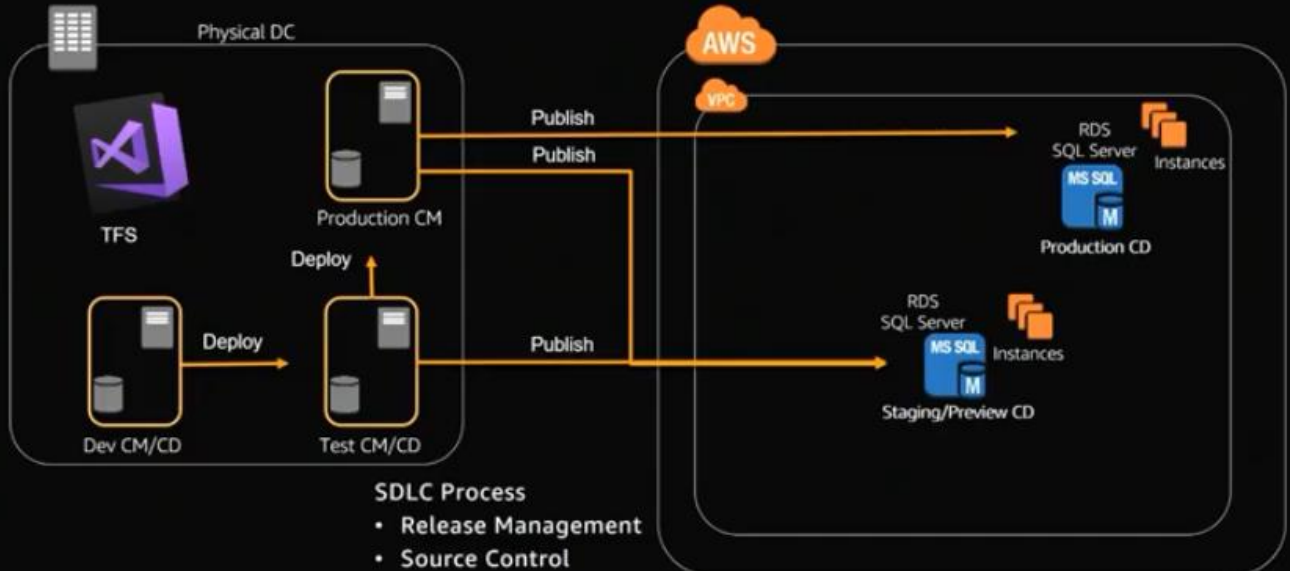
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# APPLICATION ECOSYSTEM



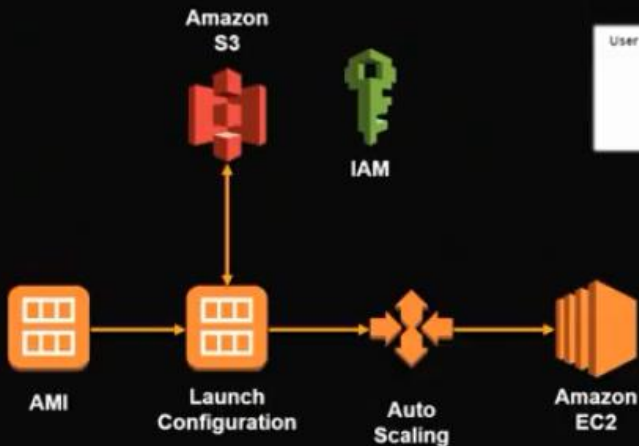
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## EC2

### Break down of AWS Components in EC2 Environments



User data ⓘ \* As text | As file | Input is already base64-encoded

```
#!/bin/bash
```

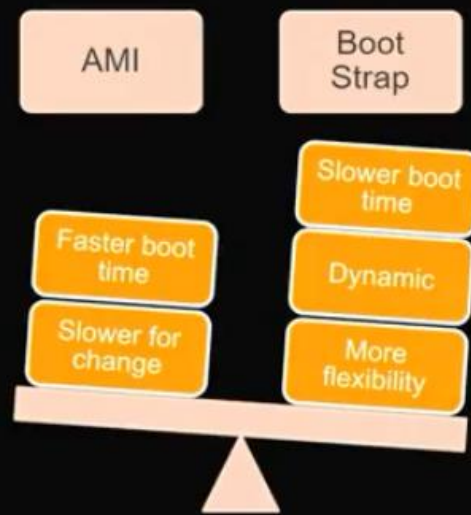
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We start with a base AMI that we reuse across our fleet of EC2 instances, then we create and configure our launch configuration that is used to pull in low level details like what IAM role are we using? What instance size we need? What EBS volume to use? we then map that into our ASG and have it scale in and out based on capacity or traffic.

# BOOTSTRAP?



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Bootstrapping allows you to pass in user scripts at launch time when getting your instances up, we can use a hybrid approach that uses some form of base AMI across the fleet

# BOOTSTRAP



## Servers Leverage Four Bootstrap Scripts

- Initialization
- Deployment
- AddToDomain
- Afterboot

## Release Management and Version Controlled via TFS and Amazon S3



```
function InstallIIS(){
    Set-ExecutionPolicy unrestricted -force
    import-module servermanager
    #add IIS feature
    (Get-Date).ToString() + " - INFO: IIS installation begin"
    Add-WindowsFeature Web-Server,Web-WebServer,Web-Common-Http,Web-
    Static-Content,Web-Default-Doc,Web-Dir-Browsing,Web-Http-Errors,Web-
    Http-Redirect,Web-App-Dev,Web-Asp-Net,Web-Net-Ext,Web-ISAPI-Ext,Web-
    ISAPI-Filter,Web-Health,Web-Http-Logging,Web-Request-Monitor,Web-
    Security,Web-Basic-Auth,Web-Windows-Auth,Web-Digest-Auth,Web-Url-
    Auth,Web-Filtering,Web-IP-Security,Web-Performance,Web-Stat-
    Compression,Web-Dyn-Compression,Web-Mgmt-Tools,Web-Mgmt-Console
    (Get-Date).ToString() + " - INFO: IIS installed"

    #add .net 4.0
    C:\windows\Microsoft.NET\Framework64\v4.0.30319\aspnet_regiis.exe
    -i | out-null
    (Get-Date).ToString() + " - INFO: ASP.NET 4.0 installed"
```

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Each environment that we manage have its set of bootstrap scripts in their S3 buckets that gets versioned and managed. The scripts leverage a common **includes** function that gets pulled down at run time. The **initialization scripts** do some base level downloading of needed software and tools that is required, splunk is one of the needed tools at this stage. **Deployment scripts** handle extracting and configuring our web apps, this is the code behind for our websites to function properly. **AddToDomain scripts** adds the web service to a known/correct domain, this is done for group policies needed.

**Afterboot scripts** are scripts that gets launched once the servers are already up and running, it contains scripts for things like scheduled tasks, folder permissions, web log cleanup in the server, etc. all these give us a working web service.


# BOOTSTRAP



**Servers Leverage Four Bootstrap Scripts**

- Initialization
- Deployment
- AddToDomain
- Afterboot


**Release Management and Version Controlled via TFS and Amazon S3**



```
function InstallIIS(){
    Set-ExecutionPolicy unrestricted -force
    import-module servermanager
    #add IIS feature
    (Get-Date).ToString() + " - INFO: IIS installation begin"
    Add-WindowsFeature Web-Server,Web-webServer,Web-Common-Http,Web-Static-Content,Web-Default-Doc,Web-Dir-Browsing,Web-Http-Errors,Web-Http-Redirect,Web-App-Dev,Web-Asp-Net,Web-Net-Ext,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-Health,Web-Http-Logging,Web-Request-Monitor,Web-Security,Web-Basic-Auth,Web-Windows-Auth,Web-Digest-Auth,Web-Url-Auth,Web-Filtering,Web-IP-Security,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Mgmt-Tools,Web-Mgmt-Console
    (Get-Date).ToString() + " - INFO: IIS installed"

    #add .net 4.0
    C:\windows\Microsoft.NET\Framework64\v4.0.30319\aspnet_regiis.exe
    -i | out-null
    (Get-Date).ToString() + " - INFO: ASP.NET 4.0 installed"
}
```



**Install Web Server**



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This is a one-line configuration for our IIS web application within the script as above


# BOOTSTRAP



**Servers Leverage Four Bootstrap Scripts**

- Initialization
- Deployment
- AddToDomain
- Afterboot


**Release Management and Version Controlled via TFS and Amazon S3**



```
function InstallIIS(){
    Set-ExecutionPolicy unrestricted -force
    import-module servermanager
    #add IIS feature
    (Get-Date).ToString() + " - INFO: IIS installation begin"
    Add-WindowsFeature Web-Server,Web-webServer,Web-Common-Http,Web-Static-Content,Web-Default-Doc,Web-Dir-Browsing,Web-Http-Errors,Web-Http-Redirect,Web-App-Dev,Web-Asp-Net,Web-Net-Ext,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-Health,Web-Http-Logging,Web-Request-Monitor,Web-Security,Web-Basic-Auth,Web-Windows-Auth,Web-Digest-Auth,Web-Url-Auth,Web-Filtering,Web-IP-Security,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Mgmt-Tools,Web-Mgmt-Console
    (Get-Date).ToString() + " - INFO: IIS installed"

    #add .net 4.0
    C:\windows\Microsoft.NET\Framework64\v4.0.30319\aspnet_regiis.exe
    -i | out-null
    (Get-Date).ToString() + " - INFO: ASP.NET 4.0 installed"
}
```

**Custom Logging**



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We also have custom code within our scripts as above



# LOGGING—BOOTSTRAP



## Ec2ConfigLog

- Captured std output of userdata

## Logs are consumed real time

- ASG tuning
- Ensure WFE launched successfully

```
DiskPart successfully formatted the volume.
DISKPART>
download: s3://mylans3/web/sitecore/prod/init.ps1 to TEMP_DIR\init.ps1
download: s3://mylans3/web/sitecore/prod/deployment.ps1 to TEMP_DIR\deployment.ps1
download: s3://mylans3/web/sitecore/prod/addtodomain.ps1 to TEMP_DIR\addtodomain.ps1
Transcript started, output file is
C:\Users\Administrator\Documents\Powershell_transcript.20171019014457.txt
10/19/2017 1:44:57 AM - INFO: Start of server setup and bootstrapping
10/19/2017 1:44:58 AM - INFO: Include.ps1 downloaded
10/19/2017 1:44:59 AM - INFO: 7za.exe downloaded
10/19/2017 1:45:01 AM - INFO: SplunkForwarderInstaller.zip downloaded
10/19/2017 1:45:02 AM - INFO: splunk_inputs.conf downloaded
10/19/2017 1:45:03 AM - INFO: splunk_outputs.conf downloaded
10/19/2017 1:45:04 AM - INFO: AppDynamics.zip downloaded
```



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We write all our bootstrap scripts to transaction log files, we point to the EC2ConfigLogs to see all our logs

# LOGGING—BOOTSTRAP



## Ec2ConfigLog

- Captured std output of userdata

## Logs are consumed real time

- ASG tuning
- Ensure WFE launched successfully

```
DiskPart successfully formatted the volume.
DISKPART>
download: s3://mylans3/web/sitecore/prod/init.ps1 to TEMP_DIR\init.ps1
download: s3://mylans3/web/sitecore/prod/deployment.ps1 to TEMP_DIR\deployment.ps1
download: s3://mylans3/web/sitecore/prod/addtodomain.ps1 to TEMP_DIR\addtodomain.ps1
Transcript started, output file is
C:\Users\Administrator\Documents\Powershell_transcript.20171019014457.txt
10/19/2017 1:44:57 AM - INFO: Start of server setup and bootstrapping
10/19/2017 1:44:58 AM - INFO: Include.ps1 downloaded
10/19/2017 1:44:59 AM - INFO: 7za.exe downloaded
10/19/2017 1:45:01 AM - INFO: SplunkForwarderInstaller.zip downloaded
10/19/2017 1:45:02 AM - INFO: splunk_inputs.conf downloaded
10/19/2017 1:45:03 AM - INFO: splunk_outputs.conf downloaded
10/19/2017 1:45:04 AM - INFO: AppDynamics.zip downloaded
```

Transcript File  
Consumed By  
EC2Config Log

Custom  
Logging



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# LOGGING—QA



## Application

- Code deployments
- Content publishing

```
10/20/2017 1:17:08 PM: Deployed GwMP (GwMP 2017-10-20_3.zip) to Production (Comment: ~...  
ConfigOnly deployment)  
10/20/2017 1:23:48 PM: Deployed GwMP (GwMP 2017-10-23_4.zip) to QA (Comment: !!Rollback from  
GwMP 2017-10-20_3.zip to GwMP 2017-10-02.zip)  
10/23/2017 5:02:01 AM: Deployed GwMP (GwMP 2017-10-23.zip) to Development (Comment: ~...  
ConfigOnly deployment)  
10/23/2017 6:22:48 AM: Deployed GwMP (GwMP 2017-10-23_4.zip) to QA (Comment: ~... ConfigOnly  
deployment)  
10/24/2017 6:45:16 AM: Deployed EpipenCom (EpipenCom 2017-10-24.zip) to Development  
10/24/2017 7:18:33 AM: Deployed Tasmarguidecouk (Tasmarguidecouk 2017-10-24.zip) to Development  
10/24/2017 7:52:51 AM: Deployed LowTca (LowTca 2017-09-27.zip) to ExternalPreview (Comment: ~)
```

Logs are consumed real  
time

- Auditability of every  
action

```
10/30/2017 16:59:51 INFO AUDIT (mylan\x99999): Publish item: master:/sitecore/Mylan.Dura.DE/Home/Privacy  
Policy/Page Data/Introduction Content, language: de-DE, version: 2, id: {E08B2E36-5B5A-41C9-AB48-  
98021B93C503}
```



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# LOGGING—QA



## Application

- Code deployments
- Content publishing

**Date/Time Stamp** **Site/Build ID** **Target** **Rollback**

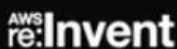
```
10/20/2017 1:17:08 PM: Deployed GwMP (GwMP 2017-10-20_3.zip) to Production (Comment: ~...  
ConfigOnly deployment)  
10/20/2017 1:23:48 PM: Deployed GwMP (GwMP 2017-10-23_4.zip) to QA (Comment: !!Rollback from  
GwMP 2017-10-20_3.zip to GwMP 2017-10-02.zip)  
10/23/2017 5:02:01 AM: Deployed GwMP (GwMP 2017-10-23.zip) to Development (Comment: ~...  
ConfigOnly deployment)  
10/23/2017 6:22:48 AM: Deployed GwMP (GwMP 2017-10-23_4.zip) to QA (Comment: ~... ConfigOnly  
deployment)  
10/24/2017 6:45:16 AM: Deployed EpipenCom (EpipenCom 2017-10-24.zip) to Development  
10/24/2017 7:18:33 AM: Deployed Tasmarguidecouk (Tasmarguidecouk 2017-10-24.zip) to Development  
10/24/2017 7:52:51 AM: Deployed LowTca (LowTca 2017-09-27.zip) to ExternalPreview (Comment: ~)
```

Logs are consumed real  
time

- Auditability of every  
action

**Date/Time Stamp of Action** **Who Published** **Target** **What Was Published**

```
10/30/2017 16:59:51 INFO AUDIT (mylan\x99999): Publish item: master:/sitecore/Mylan.Dura.DE/Home/Privacy  
Policy/Page Data/Introduction Content, language: de-DE, version: 2, id: {E08B2E36-5B5A-41C9-AB48-  
98021B93C503}
```



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# LOGGING—SECURITY



## Software

- Trend Micro IDS

```
10/19/2017 1:45:58 AM - INFO: found Trend install folder Agent-windows-1.1.x.x86_64
10/19/2017 1:45:58 AM - INFO: found Trend install msi Agent-Core-windows-1.1.x.x86_64.msi
10/19/2017 1:45:58 AM - INFO: Trend install begin
TEMP_DIR\software\Agent-windows-1.1.x.x86_64\Agent-Core-windows-1.1.x.x86_64.msi
10/19/2017 1:46:06 AM - INFO: Trend installed
10/19/2017 1:46:06 AM - INFO: Trend install folder removed.
10/19/2017 1:46:07 AM - INFO: Trend phoned home.
```

## Logs are consumed real time

- IDS monitoring starts at minute 1
- Security insight into all aspects of automation

Trend Calling Home  
Service for Orders

Version Agnostic



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The security tool gets installed dynamically during the initialization step so that we can prevent the web server from serving traffic if it is not protected

# RINSE AND REPEAT

## Environments

- Developer machines
- Upgrade testing
- Development
- Test
- Sandbox
- QA testing



Each environment can leverage the same bootstrap scripts or its own if customization is required.



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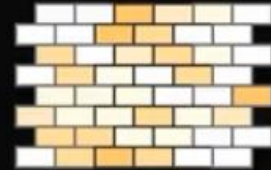
# REVIEW & LESSONS LEARNED

The environment is alive!

- Mega automation
- Real-time log visibility
- Tools for quality, security, and regulatory compliance
- Controlled release management and roll back

Don't boil the ocean all at once!

- Start with what you know and build on it
- Make sure your requirements are clear, then focus one step at a time
- Spend ample time on the planning phase
- Work closely with AWS



You will succeed!



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The Journey Not the Destination

## Next Steps



## NEXT STEPS



DynamoDB



CloudFormation



RDS—MySQL



Lambda



Amazon API  
Gateway\*



Amazon  
WorkSpaces

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