

Tutorial: How to Deploy and On-Board an OpenShift Application in DX Application Performance Management

You have decided to containerize applications and use Red Hat OpenShift as the target platform. Now, you'll want to provide the best experience you can for your development and operational teams that are going to be going to production using this tool set. OpenShift provides a proven enterprise-ready and certified Kubernetes distribution that will meet your basic needs out-of-the-box. Red Hat relies on its partner network to provide the best point solutions to add value where customers need it most.

Observability is one of those areas. Broadcom is a Red Hat partner and has gone through the certification process. This ensures its monitoring suite can seamlessly be deployed into an OpenShift cluster and will not introduce any instability to the platform.

Deploying DX Application Performance Management in OpenShift

There are two steps to enabling DX monitoring into any environment. The first is to have access to the running DX platform with an account that has permission to add new agents. The second is to deploy those agents on the target systems that will have applications to monitor.

For step one, the easiest option to get started with DX is the starter edition, which is part of the DX APM SaaS offering. This can be with the <u>DX APM Starter Edition</u>, or as part of a larger initiative using starter editions of Broadcom's <u>Enterprise Software products</u>, which involves continuous delivery and both automated functional and performance testing.

The second step is enabling the agents. This can be done in two ways when it comes to OpenShift. The first is to deploy the agent from Operator Hub within the OpenShift administration console. It includes operators certified by Red Hat. Or, enabling the agents can be done by following the instructions found within the DX APM solution. Some companies prefer this method as it is more portable across Kubernetes vendors environments.

Steps to install an operator are as follows:

First log into the OpenShift console and navigate to "Operator Hub" under the Operators section of the administrator's menu on the left of the screen. Highlighted in red on the following image:

Red Hat OpenShift Container Platform					*	Ð	0	kube:admin 👻
t° Administrator −		You are logged in as a temporary administrati	ve user. Update the <u>cluster OAuth configurat</u>	<u>tion</u> to allow others to	log in.			
	Project: all projects 🛛 👻							
Home 🗸 🗸								
Overview	OperatorHub							
Projects	Discover Operators from the Kuberr	etes community and Red Hat partners, curated	by Red Hat. You can purchase commercial so	ftware through Red H	lat Marke	etplace	🗹. You ca	an install
Search	Operators on your clusters to provid service experience.	e optional add-ons and shared services to your o	developers. After installation, the Operator ca	apabilities will appear	in the De	evelop	er Catalog	providing a self-
Explore								
Events	All Items	All Items						
Operators	Al/Machine Learning	dx apm						2 items
	Application Runtime							
	Big Data							_
Installed Operators	Cloud Provider	Marketplace						_
Workloads >	Database	A Detation	A Brodom Interingin					_
Networking >	Developer Tools	DX APM Universal Monitoring Agent	DX APM Universal Monitoring Agent					
	Integration & Delivery	provided by Broadcom, Inc.	provided by Broadcom, Inc.					
Storage >	Logging & Tracing	The Universal Monitoring Agent	The Universal Monitoring Agent					
Builds >	Networking	Kubernetes) acts as single	Kubernetes) acts as single					
Monitoring >	OpenShift Optional							
	Security							
Compute >	Storage							
User Management >	Streaming & Messaging							
Administration >	Install State Installed (0) Not Installed (2)							Ŧ

Second, as marked in green in the above image, search for "DX APM" in the Operator Hub and it will return two options. The one marked with Marketplace allows you to purchase a subscription right from the Red Hat Marketplace, the second Operator is if you have an existing subscription or are working with a trial account. That is what we are working with.

After selecting the DX APM operator, it will give you more details about the product and an install option.

	🇰 🏩 😋 🧔 kube:admin 👻
You are logged	M Universal Monitoring Agent x
es community a	
Operator Version	The DX APM Universal Monitoring Agent for Kubernetes (UMA for Kubernetes) acts as a single
All Items	deployment that automatically discovers and monitors cloud and container infrastructures and containerized application processes. UMA for Kubernetes discovers and monitors all the containers on a host. This capability allows to monitor both the Kubernetes Infrastructure (like Node, Pods, Containers, Cluster Services etc) and applications running on this infrastructure & correlate them together which
Seamless Upgrades	can help the triager to isolate if the the problem is related to the application or infrastructure
	Usage:
Auto Pilot	apiVersion: ca.broadcom.com/v1alpha1
Provider Type	kind: UniversalMonitoringAgent metadata:
Certified	name: uma-monitor
DX APM I	spec:
Agent Provider	# The agent and Enterprise Manager connection details.
provided b Broadcom, Inc.	agentManager:
The Unive for Kuberr	url: localhost:5001 # Agent/EM login credentials. credential:
Kubernete https://github.gwd.broa om.net/BROADCOM/u	dc ma clusterName: DevelopmentCluster
-operator	# type should be Kubernetes or Openshift depending on the environment
Container Image	type: Kubernetes monitor:
caapm/universalmonito	ra application:
gent@sha256:22d37e15	2d # autoattach properties
b1158363ebfe5faf6b4a	03 autoattach:
d72607949cc7d37995	08 filterType: whitelist
ede966/3cb82	# java autoattach properties
Created At	java: enabled: true

Now that the installation has started, select to use a single namespace. In this case, there was already a "caapm" project created. This can be done from the command line with the command "oc new-project caapm" or in the project section of the web console.

You are logged in as a temporary administra	ative user. Update the <u>cluster OAuth configuration</u> to allow others to log in.
OperatorHub > Operator Installation Install Operator Install your Operator by subscribing to one of the update channels to keep the Op	erator up to date. The strategy determines either manual or automatic updates.
Update Channel * (e) alpha Installation Mode *	DX APM Universal Monitoring Agent provided by Broadcom, Inc. Provided APIs
Installation Mode * All namespaces on the cluster (default) Operator will be available in all namespaces. Aspecific namespace on the cluster Operator will be available in a single namespace only. Installed Namespace * Cappm Approval Strategy * Approval Strategy * Anual Install Cancel	 DX APM Universal Monitoring Agent The DX APM Universal Monitoring Agent for Kubernetes (UMA for Kubernetes) acts as a single deployment that automatically discovers and monitors cloud and container infrastructures and containerized application processes. UMA for Kubernetes discovers and monitors all the containers on a host. This capability allows to monitor both the Kubernetes Infrastructure (like Node, Pods, Containers, Cluster Services etc.) and applications running on this infrastructure & correlate them together which can help the triager to isolate if the the problem is related to the application or infrastructure

Once install is selected, in a few moments, there will be an installed operator visible under installed operators. If you can not see it then make sure you are on "all projects" or the specific project you used.

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E Red Hat OpenShift Container Platform					🖩 🦨 😯 kube:admin 🗸
🕫 Administrator 🗸 🗸		You are logged in as a temporary	administrative user. Update th	ne <u>cluster OAuth configuration</u> to allow other	rs to log in.
	Project: caapm 🝷				
Home 🗸 🗸	Installed Operator				
Overview	installed Operators	>			
Projects	Installed Operators are represent	ted by Cluster Service Versions within t	his namespace. For more infor	mation, see the Operator Lifecycle Manager	documentation 🗹. Or create an Operator and
Search	Cluster Service version using the				
Explore	Name Search by name.				
Events	Name 1	Managed Namespaces 🗍	Status	Last Updated	Provided APIs
Operators Y	DX APM Universal		Succeeded	a faw seconds and	DX APM Universal Monitoring
OperatorHub	Monitoring Agent	Capit	Up to date	G a rew seconds ago	Agent
Installed Operators	Broadcom, Inc.				
Workloads >					
Networking >					
Storage 3					
Storage					
Builds >					
Monitoring >					
Compute >					
Line Management					
Oser Management 7					
Administration >					

Entering the configuration for the operator brings up a screen with multiple tabs. On this tab select the Agents tab, so we can create an agent to monitor the cluster.

Red Hat OpenShift Container Platform	III 🦑 😋 kube:admin 🗸
✿ Administrator	You are logged in as a temporary administrative user. Update the <u>cluster OAuth configuration</u> to allow others to log in.
	Project: caapm 👻
Home	Installed Operators > Operator Details
Overview	a contraction and the second sec
Projects	10.0 provided by Broadcom, Inc.
Search	Details YAML Subscription Events DX APM Universal Monitoring Agent
Explore	
Events	UniversalMonitoringAgents Create UniversalMonitoringAgent
Operators ·	
OperatorHub	No Operands Found
Installed Operators	Operands are declarative components used to define the behavior of the application.
Workloads	
Networking	
Storage	
Builds	
Monitoring	
Compute	
User Management	
Administration	
Administration	

When you create an agent, you can choose two views, a form view or a YAML view. The YAML view is required to configure the address of the DX APM server and to add the required credentials. After those fields are added, select create, and an agent will be up and running almost instantly.

Red Hat OpenShift Container Platform	₩ ° 0 0	kube:admin 👻
t ^e Administrator	You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.	
	Project: caapm 🔹	
Home 🗸	NY 1011 Informal Machineles Lands - County University Provide Lands	
Overview	Create Universal Monitoring Agent Create Onversal Monitoring Agent	
Projects	Create by manually entering YAML or JSON definitions, or by dragging and dropping a file into the editor.	
Search		
Explore	Contigure via: O Form View (@ YAML View	
Events		View shortcuts
	1 apiVersion: ca.broadcom.com/v1alpha1	Ener
Operators Y	2 kind: Universalmon toringagent 3 metadata:	
OperatorHub	4 name: uma-monitor	
Installed Operators	6 spec:	
Workloads >	8 url: 'localhost:5001'	
	9 clusterName: DevelopmentCluster 10 monitor:	
Networking >	11 application:	
Storage >	13 dotnet:	
	14 enabled: true 15 filterType: whitelist	
Builds >	16 java: 17 enabled: true	
Monitorina >	18 jmx:	
	20 opentracing:	
Compute >	21 correlation: 22 enabled: false	
User Management >	23 enabled: true 24 clusterPerformance:	
	25 enabled: true	
Administration >	Create	L Download

This is how the agent display looks when it is being created and deployed across all nodes as a DaemonSet, so a single instance is running on every node

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E Red Hat OpenShift Container Platform				:	*	Ð	0	kube:admin 👻
🔹 Administrator 🚽	You	u are logged in as a temporary adm	nistrative user. Update the <u>clust</u>	er OAuth configuration to allow other	to log in.			
	Project: caapm 👻							
Home 🗸 🗸	Installed Operators > Operator Details							
Overview	CALINATION DX APM Universal Monitoring A	Agent						Actions 💌
Projects	1.0.0 provided by Broadcom, Inc.							
Search	Details YAML Subscription	n Events DX APM Uni	versal Monitoring Agent					
Explore	Liniversal Menitering Age	anto.						
Events	UniversalimonitoringAge	ents				Create	UniversalM	onitoringAgent
Operators ~	Name 👻 Search by name	/						
OperatorHub								
Installed Operators	Name T Ki	lind I	Status I	Labels I	Last (Jpdated	Ţ	
Workloads >	UMA uma-monitor Ur	JniversalMonitoringAgent	Conditions: Initialized, Deployed	No labels	🚱 les	s than a	minute ago	:
Networking >								
Storage >								
Duilde S								
Monitoring >								
Compute >								
User Management >								
Administration >								

Now that the agent is installed in the OpenShift cluster. The benefits of this are DX APM gets a holistic look at everything – from the performance of the underpinning infrastructure to be able to monitor any instance of the applications it is monitoring as it scales up and down across the cluster.

Verify Monitoring is Enabled within the OpenShift Cluster

The best and most reliable way to verify that monitoring is to check within the OpenShift cluster for the processes to be running. This can be done in three steps.

First is to select the correct name space, the one that was used as part of the deployment.

# oc describe deploy tix-web-deploy		
Name: tix-web-deploy		
Namespace: tixchange		
CreationTimestamp: Mon, 28 Sep 2020 12:40:01 +0000		
Labels: app=tixchange-web		
env=BCP		
tier=frontend		
Annotations: deployment.kubernetes.io/revision=1		

Selector: app=tixchange-web,tier=frontend		
Pod Template:		
Labels: app=tixchange-web		
env=BCP		
tier=frontend		
Annotations: ca.broadcom.com/autoattach.enabled=true		
ca.broadcom.com/ca.apm.monitoring.enabled=true		
ver=1.0		
Containers:		
tix-web:		
Environment:		
CA_APM_MONITORING_ENABLED: true		

The second step is to list all the nodes, so we can verify the deployment is running on every node.

# oc describe deploy tix-web-deploy		
Name: tix-web-deploy		
Namespace: tixchange		
CreationTimestamp: Mon, 28 Sep 2020 12:40:01 +0000		
Labels: app=tixchange-web		
env=BCP		
tier=frontend		
Annotations: deployment.kubernetes.io/revision=1		
Selector: app=tixchange-web,tier=frontend		
Pod Template:		
Labels: app=tixchange-web		
env=BCP		
tier=frontend		

Annotations: ca.broadcom.com/autoattach.enabled=true			
ca.broadcom.com/ca.apm.monitoring.enabled=true			
ver=1.0			
Containers:			
tix-web:			
Environment:			
CA_APM_MONITORING_ENABLED: true			

And finally to get a list of all pods running to see there is an app-container-monitor on every node so it can inspect all running processes. In addition, there will be a cluster, clusterinfo, and prometheus pods running which gather metrics from the various available endpoints within OpenShift that expose metrics that should be captured and reported by DX APM.

# oc get pods \				
-o custom-columns=NAME:.metadata.name,STATUS:.status.phase,NODE:.spec.nodeName				
NAME STA	TUS NODE			
app-container-monitor-f2sr9	Running fixate2-2			
app-container-monitor-hs22m	Running fixate2-1			
app-container-monitor-nlph2	Running fixate2-3			
cluster-performance-prometheus-657474	4dd45-qkgt4 Running fixate2-3			
clusterinfo-8f4bfc9d7-r4ws4	Running fixate2-3			
container-monitor-676968b99c-txlvl	Running fixate2-2			
container-monitor-676968b99c-txlvl	Running fixate2-2			

As we can see each node has the appropriate pods running so it is operational.

Once you know monitoring is running in the cluster, it is time to verify logging is registered and being sent into the DX Application Performance Management server through the web interface. After logging into DX APM go to the Agents view on the left side of the menu. There should be several agents listed and connected.

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Downlo	ad Agent Show Agen	t Connection Details	Trace Agents	Search:	Search Agents
	Agent Name 🔺	Host	Process URL	Applications	State
	AuthService-DevAg	AuthService-Dev	SuperDomain AuthService-DevHost tomcat AuthService-DevAgent		Connected
	Infrastructure Agent	http_// <promethe< td=""><td>SuperDomain http_//<prometheusurl>_<port> ClusterDeployment Infrastruc</port></prometheusurl></td><td></td><td>Connected</td></promethe<>	SuperDomain http_// <prometheusurl>_<port> ClusterDeployment Infrastruc</port></prometheusurl>		Connected
	Kubernetes Agent	fixate2-2	SuperDomain fixate2-2 http_// <prometheusurl>_<port> Kubernetes Agent</port></prometheusurl>		Connected
	Kubernetes Agent	fixate2-3	SuperDomain fixate2-3 http_// <prometheusurl>_<port> Kubernetes Agent</port></prometheusurl>		Connected
	Kubernetes Agent	fixate2-1	SuperDomain fixate2-1 http_// <prometheusurl>_<port> Kubernetes Agent</port></prometheusurl>		Connected
	Logstash-APM-Plu	Experience Collec	SuperDomain Experience Collector Host DxC Agent Logstash-APM-Plugin		Connected
	Prometheus Agent	http_// <promethe< td=""><td>SuperDomain http_//<prometheusurl>_<port> ClusterPerformanceMonitor P</port></prometheusurl></td><td></td><td>Connected</td></promethe<>	SuperDomain http_// <prometheusurl>_<port> ClusterPerformanceMonitor P</port></prometheusurl>		Connected
	WebPortal-DevAgent	WebPortal-DevHo	SuperDomain WebPortal-DevHost Tomcat WebPortal-DevAgent	WebPortal	Connected

The agents involved are Kubernetes agents for every node in the OpenShift cluster. These gather metrics related to pods, namespaces, containers, and metrics around CPU and memory usage. The full list is extensive and <u>available in the</u> <u>documentation</u>.

Next are Infrastructure Agents and Prometheus agents, which can query all exposed metrics on anything they are told to watch. These metrics often go above and beyond what Kubernetes exposes on its own, as applications can expose custom metrics that Prometheus will autodiscover. OpenShift contains an embedded Prometheus instance just to support this capability; and DX's Kubernetes connector automatically connects to that instance.

Last is the LogStash-APM-Plugin, which gathers logs from a remote end-point – like nodes in a Kubernetes cluster. It can consolidate them within DX APM to add insight through the AIOps capabilities of the platform.

Full Stack Visibility of an Application

Now that we know monitoring is enabled end to end, we deploy a Java application to show how DX APM detects it, and how it is automatically monitored. By default, any application that sets the environment variable "CA_APM_MONITORING_ENABLED" to "true" will be whitelisted (i.e., approved and permitted) and monitored by the APM suite.

# oc describe deploy tix-web-deploy							
ime: tix-web-deploy							
Namespace: tixchange							
CreationTimestamp: Mon, 28 Sep 2020 12:40:01 +0000							
Labels: app=tixchange-web							
env=BCP							
tier=frontend							
Annotations: deployment.kubernetes.io/revision=1							
Selector: app=tixchange-web,tier=frontend							
Pod Template:							
Labels: app=tixchange-web							
env=BCP							
tier=frontend							
Annotations: ca.broadcom.com/autoattach.enabled=true							
ca.broadcom.com/ca.apm.monitoring.enabled=true							
ver=1.0							
Containers:							
tix-web:							
Environment:							
CA_APM_MONITORING_ENABLED: true							

Start with the Experience View screen in DX APM. It shows any applications that you have configured.

Ca	A Broadcom DX Application Performance Management	Experience View	ALL MY UNIVERSES -	 VINCE - OPEN-ACCESS-3	*
•	🛅 10/2/20 11:36:50 PM – Yesterday 11:36:50 PM	HISTORIC		Timeline	
₫ M	Experiences 2 Sorted by: My Order 🗸	•			l
2	Demo Applications	Your Applications			
<u></u>	•	97 Problem Anomaly 1 Poor Transactions: 1/36			
R.		ncaun j			
\$		33			
蒙	No data	1 1 0 1 1s 2s 2s+ SLOW ERROR			
÷.		RESPONSE TIME POOR TRANSACTIONS			
					ļ
0		Copyright © 2020 Broadcom. All Rights Reserved.		Δ	· -

Next, go to the Map section on the left and use the Application Layer view to see a more detailed view of the autodiscovered components of the application. This shows all the auto-discovered components of the application that have been called, plus external calls to a separate container running a Database and how they are related to one another.



You can also switch to an infrastructure view, by selecting the 'Infrastructure Layer' from the drop-down. This view shows how the application is deployed within the OpenShift cluster. It includes all the ReplicaSets, Deployments, and Namespaces involved on top of the pods and individual containers. In this specific case, green indicates no errors detected; red shows components that have seen an error in the time window that is being reviewed.



It is often best to start as far to the right as possible with the transaction entry point. This way, you can get to the deepest error first, as it is often the source of the problem. In this case, the error on the container shows it's hitting both memory and CPU limits. The graph shows how close to the limit it has been. Knowing this will allow the development or operations team to make a slight adjustment to the deployment's container specification, and to resolve the problem long before it causes an outage and directly impacts customers.



Next Steps

Learn more about DX APM at <u>www.broadcom.com/apm</u> or check out our <u>documentation</u> page for more in-depth information on how to configure and operate the solution.

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