

Tutorial: How to Triage and Diagnose a Problem in an OpenShift Application with DX Application Performance Management

OpenShift Container Platform is a platform for developing and running containerized applications. It is designed to allow applications and the data centers that support them to expand from just a few machines and applications to thousands of machines that serve millions of clients.

In a previous tutorial, we showed how to enroll and onboard an OpenShift application into DX Application Performance Management. Once the said application was deployed, we explained briefly and in simple steps how to set up monitoring and observability counters that capture a holistic view of the application performance.

In this tutorial, we build on top of our previous knowledge. We demonstrate how DX APM can help to identify the potential troublesome cause of the app that has been recently deployed in production. You will see how the automated capabilities of the service can speed up triaging and diagnosing the root of the problem by drilling down to the problematic area of code.

Let's get started ...

Interacting with the Application and Finding Some Problems

The application we deployed in the previous tutorial is a typical E-Commerce platform for selling all sorts of concert and event tickets. For the purpose of this tutorial, we will focus on troubleshooting this same application, but the triaging steps in DX APM can be applied to any application you are monitoring.

You can see a picture of the initial page view below:

TIXCHANGE		뛰 Sign-in ?	Search
	Concerts Conferences Festivals	Sports Theater	
Concerts Leve Main: Conferences Technical Conferences Main: Joy Concerts - TEST 121 Sports Sports Sports Theater Prevaluing: Menicula	TIXCHANG		
Show Weather			

The UI may look like it had some better days, but let's say for the purpose of this exercise that we never had any issues of complaints about that.

From the side panel on the left, we can see the main event categories where we can browse and purchase some tickets. Let's buy a few of them to record our experience.

Click on **Concerts**, and then you will see the list of Concert events:

	TIXCHANGE		₩ Sign-in ?	Search
		Concerts Conferences Festivals Sports Theater		
<u><< Main Menu</u>		Concerts		
1		Product ID Name	1	
		MU-EL-01 John Elton	l.	
		MU-JM-01 Jeff Morris A Cappella Speed-Metal Karaoke Extravaganza	1	
		MU-KL-01 Princes of Leo	l .	
1		MU-LG-01 Lady Baba	1	
		More >	Į.	
			-	

Next, try to add a few tickets to your shopping basket. Click on Elton John and pick one of each ticket seats on the next screen:

	TIXCHANGE						₩ Sign-in ?	Search
CONCEPTE			Concerts	Conferences Festivals Spo	orts Thea	ter		
SC UNCERIS				John Elton				
		Item ID	Product ID	Description	List Price			
		EST-13	MU-EL-01	Section 111, Row 11 John Elton	\$20.50	Add to Cart		
		EST-14	MU-EL-01	Section 224, Row 5 John Elton	\$18.50	Add to Cart		
		EST-15	MU-EL-01	Section 302, Row 8 John Elton	\$16.50	Add to Cart		

Proceed to checkout and complete the purchase:

<< Main Menu	Concerts Conferences Festivals Sports Theater Shopping Cart							
Item ID	Product ID	Description	In Stock?	Quantity	List Price	Total Cost		
EST-13	MU-EL-01	Section 111, Row 11 John Elton	true	1	\$20.50	\$20.50	Remove	
EST-14	MU-EL-01	Section 224, Row 5 John Elton	true	1	\$18.50	\$18.50	Remove	
EST-15	MU-EL-01	Section 302, Row 8 John Elton	true	1	\$16.50	\$16.50	Remove	
					Sub T	update Cart		
		())Proof	ed to Checkou	0				

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now to i nade and Diadn	use a Problem in an Ob	ensinin Additcation v	IIII DA ADDIICALION I	

	Concerts Conferences Festivals Sports Theater	
	Please confirm the information below and then press continue	
	Order 2020/10/17 04:25:33	
Billing Address		
First name:	awesomen	
Last name:	supersupedurer	
Address 1:	1 CA Pl	
Address 2:	Suite 1010	
City:	Ireland	
State:	NY	
Zip:	11665	
Country:	Ireland	
Shipping Address		
First name:	awesomen	
Last name:	supersupedurer	
Address 1:	1 CA PI	
Address 2:	Suite 1010	
City:	Ireland	
State:	NY	
Zip:	11665	
Country:	Ireland	
	Concinde	

So far, so good. Now let's say you enjoyed the experience, and you left positive feedback about the shopping experience. On a later date, you want to attend a conference. This time you log in again into the same platform, only now you click on **Conferences:**

	TIXCHANGE		뛰 Sign-ouf MyAccount ?	Search
	1	Concerts Conferences Festivals Sports Thea	ter	
<< Main Menu		Conferences		
		Product ID Name CO-CA-01 CA World 2011 CO-CA-01 Belizz By Boat with Clayton CO-SA-01 SA Immersion Training		

You want to attend the CA World 2011 and as before, you go ahead to purchase some day passes, so you click on the event link:

Structure Tixchange				₩ (sign-out) MyAccount (?
	Concerts	Conferences Festivals Spo	rts Thea	leater
< <u>CONFERENCES</u>		CA World 20)11	
Item II	Product ID	Description	List Price	ice
EST-58	CO-CA-01	5-Day Pass CA World 2011	\$80.00	(Add to Cart)
EST-59	CO-CA-01	5-Day VIP Pass CA World 2011	\$120.00	Add to Cart

You click on the Item ID cell EST-58, as you want to see more information about the 5-day pass ticket. Sadly, you are presented with an error screen informing you that something wrong has happened.

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STIXCHANGE	₩ [Sign-out MyAccount ?
	Concerts Conferences Festivals Sports Theater
Something happened	
But no further information was provided.	

Then you think you may as well buy the tickets anyway as you've made up your mind, so you go back and try to add the ticket into the shopping cart. Then this happens:

Some TIXCHANGE	₩ Sign-out MyAccount ?
Concerts Conferences Festivals Sports Theater	
Error	
com.jtixchange.struts.BeanActionException	
Error dispatching bean action via URL pattern ('addItemToCart'). Cause: java.lang.reflect.InvocationTargetException	
Stack	
<pre>commutation of the second second</pre>	ionTergetException

As a plain user, you understand that something wrong is going on and you kindly inform the site support staff that there is an error on that page. Sadly for the platform, you proceed to find another website to purchase the season pass and complete the purchase there.

As you have guessed, this is a typical reaction for that situation, and for things like that to propagate into production is not only embarrassing but costly. Is there a way to prevent that from happening in the first place? Or is there a way to at least be more proactive and diagnose the problem before any complaints?

Investigating the issue with DX APM

In this section, we're going to see how to proactively diagnose problems in production with DX APM.

In the previous section, we saw how a problem that propagated in production can result in a negative experience and loss of revenue. Next, we are going to switch to the role of an SRE that monitors the application behavior for issues, and can go into the code itself and make changes when needed.

First, we log in to DX APM:

		Trial 174 days remainin
technologies A Broadcom D	DX SaaS	TDESPOUDIS@GMAIL.COM OPEN-ACCESS-3
☆	Trial in progress Trial in progress DX App Experience Analytics Enables you to deliver an exceptional digital experience for your customers across web, mobile, and wearables channels by providing: DX Application Performance Management DX Apple solution that leverages machine learning and data from diverse data sources to provide comprehensive insights: Advanced AlOps solution that leverages machine learning and data from diverse data sources to provide comprehensive insights: Advanced AlOps solution that leverages machine learning and data from diverse data sources to provide comprehensive insights: Advanced AlOps solution that leverages machine learning and data from diverse data sources to provide comprehensive insights: Advanced AlOps solution that leverages machine learning and data from diverse data sources to provide comprehensive insights: Advanced AlOps solution that leverages machine learning and data from diverse data sources to provide comprehensive insights: Advanced AlOps solution sources to provide comprehensive insights: 0 User session playback 1 User behavior Insights App Performance dill-downs into Docker, Node js. PHP, Java, .NET, and more Predictive capacity analytics	rees e ta le
	OPEN OPEN OPEN	
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Upon logging in to DX APM, you will be presented with the **Experience View** screen which shows a list of enrolled applications that the platform monitors.

*			
E	Experiences 2 Sorted by: My Order ~		
	Tixchange 📀	Your Applications 📀 🛨	
	Problem Anomaly O Poor Transactions: 217 / 1.8k Poor Transactions: 217 / 1.8k	88 Problem 1 Anomaly 0 HEALTH Poor Transactions: 217 / 1.8k 217 / 1.8k 217 / 1.8k	
¢ ⁷	1.6k	1.6k	
盡	0 0 0 217 1s 2s 2s+ SLOW ERROR	0 0 0 217 1s 2s 2s+ SLOW ERROR	
ŧ,	RESPONSE TIME POOR TRANSACTIONS	RESPONSE TIME POOR TRANSACTIONS	
E			

This view shows a summary view of the end-user transaction health for the monitored application on the cluster. By default, the monitoring windows are for the last 24 hours, but you can configure that in history or with live updates.

We can see that the Tixchange application shows some errors. From this view, we can investigate those errors by clicking on the Card and checking the next screen.

A	🔝 Last 8 Minutes 🐠 LIVE 🙁 🏫 > Tixcha	nge	Timeline
ä M	Experiences ③ Application ~ 0/2	orted by: My Order 🗸	PROBLEMS
	WebPortal 📀	DefaultServlet service	experienced Alerts, Error Messages
	86 Problem Anomaly 0	100 Problem O Anomaly O	IMPACTED EXPERIENCE CARDS WebPortal
<i></i> []	HEALTH Poor Transactions: 213 / 1.5k	HEALTH Poor Transactions: 0 / 193	POSSIBLE CULPRIT INFORMATION APPLICATION : Item_jsp service
φ,	1.3k		ANOMALIES
FAVOF	0 0 0 213	193 0 0 0 0	No anomalies detected
-	1s 2s 2s+ SLOW ERROR	1s 2s 2s+ SLOW ERROR	
ŵ	RESPONSE TIME POOR TRANSACTIONS	RESPONSE TIME POOR TRANSACTIONS	
F <u></u>			

Here we can see the WebPortal application that hosts the Tixchange project. On the right-hand side you can see a panel with the overview of the Problems and Anomalies detected here. This is useful as it gives you insights about where the errors originate and which components are affected.

Click on the WebPortal card to see the detailed view:

A	🔝 Last 8 Minutes 🐠 LIVE 🗙 🏫 > Tixcha	nge 🗲 WebPortal	Timeline
蔵	Experiences S Name ~ 0/10 Sorted	y: Error count 🗸	PROBLEMS
2	Apps WebPortal URLs shop/vie 😪	Apps WebPortal URLs shop/ind	component them_spiservice in Application WebPortal experienced Alerts, Error Messages
<u></u>	Problem Anomaly 0 Poor Transactions: 189 / 367	Problem Anomaly O Poor Transactions: 0 / 256	IMPACTED EXPERIENCE CARDS Apps/WebPortal/URLs/shop/view/tem.shtml
<i>.</i>		256	PUSSIBLE COLVENT INFORMATION APPLICATION: Liem_jspiservice
			No anomalies detected
¢,	RESPONSE TIME POOR TRANSACTIONS	RESPONSE TIME POOR TRANSACTIONS	
E	Apps WebPortal URLs shop/ne 📀	Apps WebPortal URLs shop/ne	
	Problem Anomaly HEALTH Poor Transactions: 0 / 51	100 Problem 0 Anomaly 0 HEALTH Poor Transactions: 0 / 29	

This screen shows the related paths and endpoints that serve particular business services. We can see the individual health and performance bar charts, and we have the option to sort them by parameters. By looking at the dashboard above we can quickly conclude that the **viewItem** endpoint is experiencing major problems.

A problem is something that can be categorized as a high-severity effect that has an impact on the end-user. An anomaly is an effect that deviates from the normal behavior and requires some attention.

To proceed forward, we need to click on the Problem link that shows the detailed report of the errors:

↑ 意	89 HEALTH SCORE Poor: 23k 7 Total:205k 7 RESPON	TTME POOR TRANSACTIONS AVERAGE RESPONSE TIME	TRANSACTION VOLUME
2	≺ Back ↓	Map View Evidence Timeline	
14	Component Item_ispiservice in Application W ebPortal experienced Alerts, Error Messages	Application Layer Application Infrastructure	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
<u>/</u> 0	Duration: 5 Days 1 Hour 49 Minutes 45 Seconds	E www.benjow.gestarlike.com	
–	Impacted Experiences:1	tiv web - k8x. pod. contairer_name	
*	Application Components:4	E fore.pone.	
ŵ	JspServlet service Ope		
E	Apps/WebPortal/URLs/sh op/view/tem.shtml		
	ActionServlet service		
	Infrastructure Components:1		

This is the Analysis Notebook view, which is very helpful as it depicts several components including:

- The Network Map view of the Microservice components,
- The Evidence Timeline that shows the type of errors throughout the time period selected,
- A panel with flags pointing to the detected culprit that causes the errors.
- Showing Application, Infrastructure and network correlation with the root cause either application, network or infrastructure component.

The panel on the left-hand side already informs us that the culprit is one Application Component. This is very useful as it narrows down considerably the investigation surface.

Click on the Culprit flag and then scroll down into the panel with the title:

Component Overview for SERVLET Item_jsp|service

There you can see the metrics view of the Items_jsp servlet and you can check each one of the boxes to see a graph of the metrics. You are mostly interested to see the combined Errors Per Interval and the Responses by interval. You can select both boxes and use the dropdown **Combine** option on the right to merge them all in one graph:

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You can see that all responses resulted in errors, and that's really bad. If you click on the **Performance Time comparison** tab, you can inspect the whole metrics in one view; and when you hover on top of one graph, you can see the parallel values on each dimension:

	Metrics Tree Performance Time Comparison Components Business Transactions (2000)										
	Metric Comparison Tim	ne Offset: 1 Day 🌱 Preset 🌱									
a	Blame Point Metrics Yesterday 9:23:00 AM	Blame Point Metrics Today 9:23:00 AM									
N	Average Response Time (ms)	Average Response Time (ms)									
82											
<u></u>											
	Errors Per Interval	Errors Per Interval									
¢ ⁷											
1	Responses Per Interval	Responses Per Interval									
Û,											
E											
	Stall Count	Stall Count									
	Concurrent Invocations	Concurrent Invocations									
0	٨										

Clicking on the last tab – Business Transactions – can reveal more information about the failing requests. Actually, this tab exposes a more drilled-down view of the request-response cycle. DX APM automatically collects deep dive diagnostics of application transactions.

Component Overview for SERV	'LET Item_jsp	service						
Metrics Tree Performance Time Comparison	Components	Business Transactions (512)						
Item_jsp service > 512 Business Tr	ansactions						<u>ب</u>	ŝ
Url		Name	Timestamp	Duration	Trace Type	User Id		
					~			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:07:23 PM	N/A	Error			^
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:14:16 PM	N/A	Error			1
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:08:04 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:16:39 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:25:56 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:10:05 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:08:04 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:26:54 PM	105 ms	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:10:01 PM	135 ms	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 5:59:26 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:25:36 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:05:55 PM	125 ms	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:03:11 PM	N/A	Error			
/jtixchange_web/shop/viewItem.shtml		WebPortal	1/18/21 6:05:33 PM	N/A	Error			-

As you can see there is a list of erroneous transactions. By clicking in one of them reveals the source of the problem. (It may take a few seconds to load the details, though).

	> 20	5 Business	s Transact	tions >	1/18/21 9	:59:29 AM	(53 ms) /	jtixchange_w	eb/shop/vie	witem.shtmi													ক	8
^	s v Search X 0/0																			ſ	Export D	ock Size 📃		×
F		23 ms	73 ms	123 ms	173 ms	223 ms	273 ms	323 ms	373 ms	423 n	ns 4	73 ms	523 ms	573 ms	623 ms	673 ms	723 ms	773 ms	823 ms	873 ms	923 ms	973 ms	1023 ms	1073
0	Puci	nore Soamon	tTivebange	litixohango	web/chen/viv	witom chtml	1/19/21 0	-50-20 227	AM . 1096 .	nc - 12 con	nonontr													
	Dusi	ness segmen	n nxchange	Juxenange	_web/shop/vii	ewitem.situm	- 1/10/21 9	.55.25.5211	MIWI - 10801	115 - 12 001	nponents													
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F								€	Q	0	2 <	< >>	Tre	20	✓ WebP	ortaliUB	sishon/viewlt	tem shtml	1/18/2	1 9.59.29	615 AM - 53 I	ns - 24 cor	nnonents	
⊢	0	ms 5 m	ıs 10 m	ns 15 m	ns 20 ms	25 ms	30 ms	35 ms	40 ms	45 ms	50 ms	55 ms											Expand C	ollapse
^	0												Pa	th		1	Timestamp	Dur	ation	Percent	Invocations	Source L	ine	
	6	Frontends	Apps WebPo	rtal URLs sh	op/viewItem.s	html (HttpSer	vlet.java:723)					-	E Frontend	s Apps We	bPorta 1	/18/21 9:59:2	9:615 53 1	ns i	00.00	1	HttpServ	/let.java:7	23 🔺
		Servlets Actic	mServlet (Ht	pServlet.jav	a:723)									 Servlet 	s ActionSe	ervlet 1	/18/21 9:59:2	9:615 53 1	ns i	100.00	1	HttpServ	/let.java:7	23
		javax.servle	et.http.HttpSo	rvlet::servic	e (HttpServlet	.java:614)								🔻 java	x.servlet.h	ttp.Httl 1	/18/21 9:59:2	9:616 52 r	ns 9	98.11	4	HttpServ	let.java:6	14
		 Struts/Bean 	Action (Bear	Action.java	:119)									• or	a anacha a	ostalin [,] 1	/10/21 0-50-2	0.616 0 m	° (1 00	1	Roenone	oFoodo i	91/9
		TTYChang	al Astion/Cat	logRombrid	ultam (Catalo	aRaan iawa 2	12)						Con	nponent Detail	5									
		reaching	Uhange/Action/CatalogBean/viewHem (CatalogBean.java:243)									Ide	entification	ao woh/ohor	viewlter	ohtml							^	
			JTiXChange/Service/CatalogServi											Path: Frontends	Je_web/shop Apps/WebPo	ortaliURLs	shop/viewItem.sl	html						
													De la	-f										- /
													Pe	Duration: 53 ms										
																C								*

You will actually see the correlation of the request-response timeline and the reported stack trace. There are some lightning icons (\bigcirc \checkmark) that are marked as potential culprits. By clicking on each of the lightning boxes and inspecting the stack trace on the right-hand side we can easily conclude that the **ItemSqlMapDao** object tries to find a product item in the database and somehow fails to find it, so it throws an error might be due to the item being over.

Note that you may see errors propagated and impacted end users experience viewItems.html shown with lightning icons

(**ID**) .In addition, by inspecting the Component Details section on the bottom right corner, we can infer that **ItemSqlMapDao** class **getItem** method at line 28 causes the error.

	> 8	0 Busin	ess Tr	ansactio	ns > 1/	/18/21 9	:59:29 AN	d (53 ms)	/jtixchange	_web/shop/	viewlter	m.shtml														ক্রি	8
		Search		×	0/0																		[Export C	lock Size		>>
									35 ms	85 n	IS	135 ms	s 1	85 ms	23	5 ms	285 ms	335 ms	385 ms	435 ms	485 ms	535 ms	585 ms	635 ms	685 ms	735 ms	785 m
0	Busi	iness Sea	nent/Ti:	change//it	ixchange w	eb/shop/vie	ewitem.shtn	nl - 1/18/21	9:59:29.32	7 AM - 108	6 ms -	12 com	ponents	;													
0		_			5-				© WebPo																		
F										Q (¢	> <		X X	>	Tree	•	~ Web	Portal UF	Ls shop/viev	wltem.shtm	l - 1/18/	21 9:59:29	615 AM - 53	ns - 24 co	mponent	s
	0 ms	5 n	ns	10 ms	15 ms	20 ms	25 ms	30 ms	35 ms	40 ms	45	ms	50 ms	55 r	ms											Expand	Collapse
0		Frontends	Apps/W	ebPortalIUF	al.slshon/vie	wItem.shtm	al (HttpServ)	et.iava:723)								Pat	h	-	(0)	Timestamp	Du	iration	Percent	Invocations	Source	Line	
																			Change	1/18/21 9:59	0:29:666 01	ns	0.00	1	ItemSql	MapDao.	java:2
	Ser	viets Actio	onServie	t (HttpServ	let.java:723)													– 1	TixChan	1/18/21 9:59	9:29:666 01	ns	0.00	0	ItemSql	марџао.ј	java:2
	j	avax.servl	et.http.H	IttpServlet::	service (Http	Servlet.jav	a:614)											con	n.sun.pro	1/18/21 9:59	9:29:667 01	ns	0.00	0	N/A		_
	- 5	Struts Bean	Action	(BeanActio	n.java:119)												• (org.apache	tomcat	1/18/21 9:59	0:29:667 1	ns	1.89		WsFilte	r.java:50	
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	,	TIACIang	epreuos	ije atalog De	anyviewitem	CatalogD	can.java.245	<i>,</i> ,								C	lass: com.jtp	change.pers	istence.sql	mapdao.ItemSq	IMapDao						*
								JTiX	Change Serv	ice Catalog	Servic.					D	ataCreation I	ype: 0	Doreicton	and tom Sal Man	and antitam:						
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													1.1			E	ception: Thi	is ItemId is no	ot supporte	dCan you fin	d out what's t	nis ItemId	:-)?				
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																M	ethod: getite	em									
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																	caource Line: H	temSolManDa	ao iava:28	ncentemoqiMa	soaojyentem						
																т	nread Group	Name: main	,								*

With this information, we can now pass it to the developers; or, as an SRE with an error budget, you can fix it yourself with some proper documentation.

Next Steps

Learn more about DX APM at www.broadcom.com/apm 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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