



IBM Software Group

Leverage Holiday Readiness: Prepare for Peak Commerce Season

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WebSphere® Support Technical Exchange



This session will be recorded and a replay will be available on IBM.COM sites. When speaking, do not state any confidential information, your name, company name or any information that you do not want shared publicly in the replay. By speaking during this presentation, you assume liability for your comments.

Agenda

- Peak Day Pitfalls
- Smarter Commerce Holiday Readiness Program
- Risk Mitigation thru e-Support
- Working with IBM Support
- Lessons Learned from 2013 Holiday
- Holiday Readiness Program: Getting on Board



Peak Day Pitfalls



Don't be caught making these statements during the week of Black Friday!

"We just loaded all the new promotions from marketing last night, and now it takes 20 seconds to add to cart!"

"We only have 3 more defects to close out then we can push out our final release just in time for Thanksgiving rush!"

"There was a mandatory security fix pushed out in September? Can we still squeeze it in on time?"

"We had an outage on Monday, but didn't capture any javacores. What do we need in place for next time?"

"I'm relieved we got our massive new catalog on production now. At least we tested the old one already last month."

"Anyone else notice those Out-of-memory errors we've been getting for a while?"

"I just noticed our site is pretty slow.. We still have a few days till Thanksgiving, should we open a PMR?"



Smarter Commerce Holiday Readiness Program

- IBM taking a **proactive approach** to reach out to clients in preparation of peak days
- Success thru **enhanced IBM collaboration** partnered with **proactive risk mitigation**
- Internal and seamless **collaboration** across product and functional teams within Smarter Commerce solution, on client's behalf
 - **Support, Services, AVP, Client Success, Sales and Client Reps, Lab Advocates**
- Internal IBM "watch list" of client who are perceived at risk
 - Gather info in advance to learn about a client's history, business peaks, plans, preparation
 - Helps support react quickly with relevant background info to be on alert
 - Share environment recommendations and operational best practices

Mitigate Risk

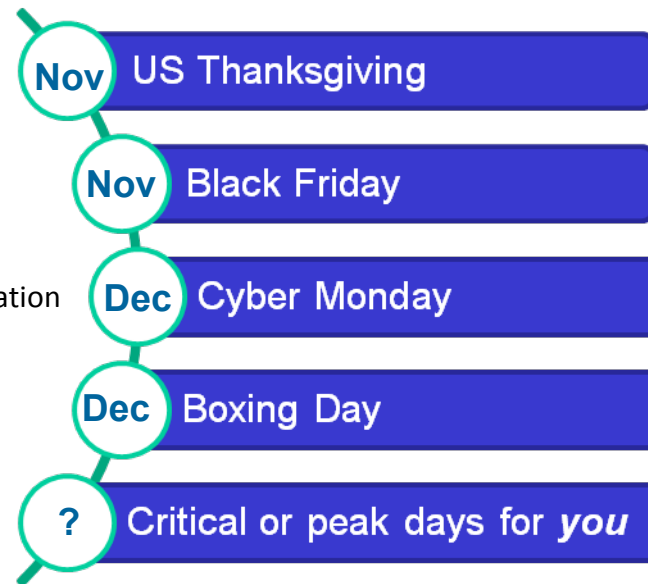
- Proactively reduce identified risk areas
- e-Support allows clients to be prepared, avoid problems
- Internal initiatives to prepare staff, continuously monitor

Timely Response

- Heightened awareness to key activities and timelines
- Re-enforced staffing availability throughout key dates
- Round the clock management coverage

Expedite Resolution

- Collaborate between internal focals across both product sets and functional units
- Share insights and understanding of client activities at regular internal checkpoints
- Pre-determined cross-product and cross-functional escalation paths



Holiday Readiness – What is it *really*?



 IBM Client Success Essentials - Holiday Readiness : <https://ibm.biz/BdFs3D>

*“Holiday Readiness is a **communication partnership** of IBM and our clients taking proactive measures together to prepare for a peak holiday season. Our goal is to proactively ensure our clients have a successful peak revenue period, by providing a stable IBM retail solution and reacting quickly to any critical situation.”*

It is about the Client preparing ...

- Leverage e-support initiatives on best-practices, lessons learned
 - Blogs, webcasts, Knowledge Center
- Learn fast and deep self-diagnosis techniques
- Share preparations, activities, risks with IBM
- Ensure recommended fixes and settings used

It is about IBM preparing ...

- Maintain internal watch-list of ‘at-risk’ clients
- Regular proactive communication across Support, Services, Sales, AVP, CSM, Execs
- Build deeper understanding of client environments, deployments, go-lives
- Contribute vast amounts of best-practices



IBM

Risk Mitigation thru e-Support: IBM Client Success Essentials

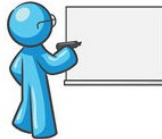
"Bringing together users of IBM Industry Solutions software to share, collaborate and connect with each other virtually"



IBM Client Success Essentials

Technical Exchange Webcasts

- Technical experts share their knowledge and answer your questions on a variety of topics for WebSphere Commerce, Sterling Order Management, etc
- Open-Mic's, Ask-the-Experts allow for more Q&A
- 7 Webcasts thus far in 2014 across Performance, Search, Dataload, and more
- Several more booked for 2H 2014



Support Blogs

- Go beyond the documentation to learn from Support
- Subject Matter Experts directly share best-practices, troubleshooting tips, lessons learned

→ [WebSphere Commerce](#)

→ [Sterling Selling & Fulfillment](#)

Proactive Notifications

- Regular notifications of new news, technotes, iFixes as well as important product flashes
- Will help keep you informed of new security bulletins
- Leverage social media or various other channels to stay connected to the community

→ [List of Available Subscriptions](#)



Quarterly Newsletter

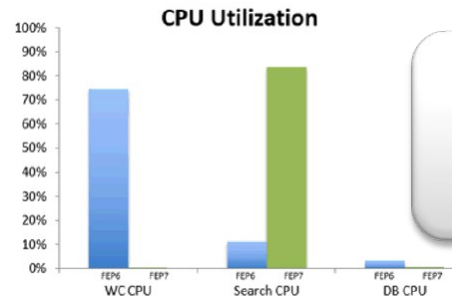
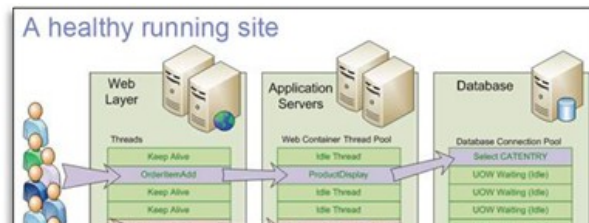
Features the most requested documents as well as those identified as valuable in helping questions

- Highlights planning & maintenance with new fixes
- Helps educational needs with various knowledge bases

→ [2Q Newsletter](#)

Risk Mitigation thru e-Support: Technical Exchange Webcasts

 **WebSphere Commerce Upcoming Live Webcasts and Replays:** <https://ibm.biz/BdFiXD>



“What is new for the data cache in Feature Pack 7?”

“For Search, What performance improvements can I expect to see with Feature Pack 7?”

“Are there tuning best practices specific for DB2 PureScale?”



September 4, 2014 – Working with IBM Support



May 22, 2014 - Ask the Expert: WebSphere Commerce Performance

Experts from the WebSphere Commerce Development, Services and Support teams will join this Ask the Experts session to answer questions related to tuning, performance, and stability for WebSphere Commerce sites.



August 29, 2013 - WebSphere Commerce Performance

Experts from the WebSphere Commerce Development, Services and Support teams had a session to answer questions related to tuning, performance, and stability for WebSphere Commerce sites.



August 14, 2013 - WebSphere Commerce - Introduction to Troubleshooting System Outages

Introduce WebSphere Commerce administrators to different troubleshooting techniques for outages. At a high level the presentation demonstrates how administrators investigate, which relevant data to collect, and how the data can be analyzed.



August 6, 2013 - WebSphere Commerce - Common Scenarios Affecting the Availability of a Site

A high-level description of common causes that can affect the availability of a WebSphere Commerce site. It explores how each tier responds and provides tips and guidelines to identify the root cause.



June 28, 2012 - Using WXS with WebSphere Commerce



June 21, 2012 - WebSphere Commerce Data Cache Overview and Configuration

Overview of configuration settings of Data cache for WebSphere DynaCache and eXtreme Scale to improve WebSphere Commerce performance and scalability



POSTS BY TAG: PERFORMANCE

DATE | LINKS | COMMENTS

WebSphere Commerce tuning deep-dive: Dynacache/DRS Invalidations

Andres Voldman | Feb 0 | Tags: | performance | was | support | drs | performance | was | dynacache | troubleshooting | 0 Comments | 3,352 Views

When cached data becomes invalid or stale, Dynacache will send an invalidation message that is received by all the JVMs in the cluster that subscribe to the replication domain, and also by Xtreme Scale (WCS) if used. It is possible that if invalidations are misconfigured or unheeded, the cost replication creates from light performance degradation, to a complete outage. In this post I will quickly review some tips for monitoring and tuning invalidations in WCS. What happens when DRS is overloaded? If DRS is overloaded, the...[\[Continue Reading\]](#)

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Beware of the (connection) storm!

Andres Voldman | Feb 10 | Tags: | dr2 | was | oracle | performance | was | support | voldman | troubleshooting | 0 Comments | 2,304 Views

A "Connection Storm" is a behaviour that could be seen in large production environments as a result of a slowdown in the app server or database layers. It happens like this: Let's say your site has 50 servers, each configured with 30 Web Container threads. On a typical day, the JVMs have more than 8 active threads at any given time, and each server maintains in average 10 connections to the database. Now there is a slowdown, which can be either on the database or the WebSphere Commerce JVMs. For this example...[\[Continue Reading\]](#)

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mpmstats: The eye to the site

Andres Voldman | Feb 0 | Tags: | performance | troubleshooting | was | voldman | mpmstats | was | support | 0 Comments | 2,205 Views

The mpmstats reporting module of the IHS web server is one of the most useful monitoring tools available, and it's even enabled out-of-the-box! mpmstats will print statistics of thread usage to the errorlog. This data can be used to tell the loadusage of the site or validate the configuration. This blog posting will show you the kind of data mpmstats reports and how it can be used. mod_mpmstats http://ipubli.boulder.idm.com/cmdtgs/vshvsh/day/2/0/mod_mpmstats.html mpmstats default configuration mpmstats is...[\[Continue Reading\]](#)

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Locking on Orders tables and Multi-click

Andres Voldman | Feb 10 | Tags: | troubleshooting | performance | voldman | locking | was | support | was | 0 Comments | 1,305 Views

Sometimes during a production site slowdown, DBAs notice a very high amount of row level locking on the Orders tables. Then, lacking any other evidence, the locking is thought to be the root cause of the production issue. Although this can be possible, in practice, in almost every situation locking on the Orders tables is a side-effect. This is why: Let's say the site is running normally and responsive. Then, all of the sudden, the site becomes slow. Shoppers become impatient and start to double-click. These users manage to now...[\[Continue Reading\]](#)

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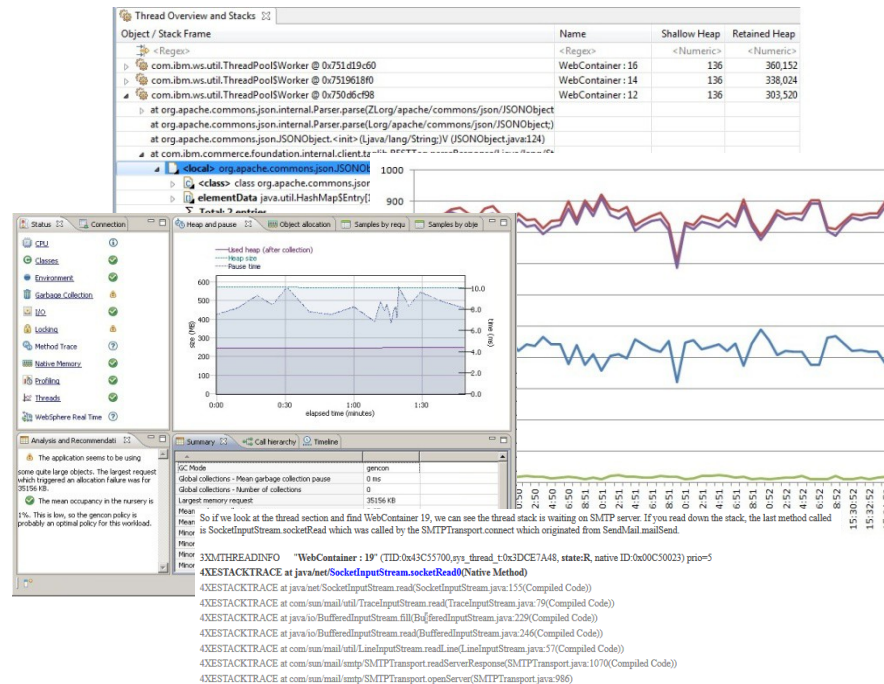
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Holiday Readiness: https://www-304.ibm.com/connections/blogs/wcs/tags/holidayreadiness?lang=en_us



Risk Mitigation thru e-Support: Proactive Notifications



-  Follow Twitter Account (@IBM_Commerce) to catch latest blogs, fixes, technotes
- Ensure products are up to date with latest levels possible, plus any Recommended Fixes
 - [Recommended fixes and settings for WebSphere Commerce Version 7](#)
 - [Recommended Blog - Recommended Search APARs Updated for FEP7](#)
 - [Recommended fixes and settings for Sterling Order and Warehouse Management Version 9.2](#)
- Review published recommendations and best practices , including 'MustGather' documents
- Help minimize data capture and troubleshooting time in event of a crisis
 - MustGather Listing: "Read First for WebSphere Commerce 7.0"
<http://www.ibm.com/support/docview.wss?uid=swg21440712>
 - Sterling Selling and Fulfillment Suite (SSFS) List of MustGathers
<http://www-01.ibm.com/support/docview.wss?uid=swg21673807>
- Sign up for proactive notifications to stay on top of any critical updates or news from IBM Support
 - ✓ [Commerce Flashes and Alerts](#)
 - ✓ [Quarterly Pro-active Commerce Newsletter](#)
 - ✓ [Support RSS Feeds](#)
 - ✓ [Follow Commerce on Twitter](#)

Working with IBM Support: Expedite Problem Resolution

▪ Partner with IBM for Effective Resolution

- Everyone who opens a PMR should have a unique userID in the Service Request tool
- Who will be the primary contact, when will they be working, what is the best way to contact them?



Describe the Business Impact of this problem to you, your business users, and shoppers

- Include upcoming project deadlines, scheduled deployment, any lost data, failure to meet service level agreements

▪ Utilizing L2/L3 Support:

- Support will join calls to discuss problem details, share our findings after reviewing the data
 - Provide problem details and data in PMR prior to requesting Support join bridge calls
- Support is most effective with data in hand, reviewing it offline (not on a bridge call)
 - Support will NOT remain on bridge after sharing findings. Support can return to answer explicit questions
 - Support will NOT join bridge during data capture or during solution implementation.

▪ **Know the problem details before opening a PMR**

- ☐ What is the problem? what time did it happen? what scenario is captured in logs? Can it be reproduced?
- ☐ What maintenance is applied in the environment? (Fix pack, feature pack, interim fixes/APARs, HotFixes, etc.)
- ☐ What you have already done to try to troubleshoot or resolve the issue?
- ☐ Does it work on other environments? What is different between environments? (code/data/traffic/hardware)
- ☐ What changed? Any recent data loads, upgrades, promotions, or traffic increase that could contribute?
- ☐ Explain data sent to IBM. What was captured/scenario? timestamp of problem? how does IBM recreate?



WAS L2 Support



Commerce L2 Support



Commerce Development



Recommended Blogs: [The more \(details\) the merrier!](#) [Jeepers \(Scope\) Creepers](#)

Working with IBM Support: Give us a fighting chance!

- Quick diagnosis and recovery is critical when dealing with a production system outage, avoid costly subsequent outages
- Lack of data or context can hinder ability to troubleshoot a problem altogether (by you, us)

MustGathers and Data Collection:

- Review key **Mustgathers** in advance (specifically those around Crash, Hang, High CPU)
 - [WebSphere Commerce performance problems with DB2 databases](#)
 - [Out of Memory MustGather](#)
 - [Performance, hang or high CPU MustGather](#)
 - [Crash MustGather](#)
- ▶ Some critical data requires modifying configs in advance (eg. Capturing system core dumps)
- ▶ Pre-configure proper logging levels or diagnostics (eg. Load balancers, webserver access logs, mpmstats, DB snapshots)
- ▶ Diagnostics may be intrusive, need to understand what can capture and when – don't create a bigger problem!
- ▶ Massive and unmaintained logs greatly increase FTP transfer time, IBM download time, Support parsing time (native_stderr.log, IHS access log, db2diag.log, etc)
- ▶ Lack of pre-reviewed data can mean subsequent uploads (eg. logs do not contain the error)

Monitoring :

- Monitoring must be in place well in advance, and interpretation understood
 - ▶ How does traffic normally look like? Can you tell when something is abnormal? What is the baseline?
 - ▶ What traffic is normal? Can you tell when a crawler/bot is hitting you?
 - ▶ Can you tell what is happening at a network level? (eg.. Lost packets, clogging up the network, etc)
- Don't let 3rd party monitoring itself be what brings you down! Enable only what is necessary



Working with IBM Support: Give yourself a fighting chance!



Notifications and Alerts:

- Lack of system **notifications** leading to slower reaction time can cause you to miss window of opportunity
 - ▶ Failure to trigger a particular collection or command (ie. kill -3 to generate javacores) or logs roll over
 - ▶ Lack of archived or historical logs may lead you to miss capturing the issue

Commerce Maintenance Levels

- Being on old maintenance levels hurts our ability to troubleshoot, mitigate, or provide fixes or enhancements
 - ▶ For example, inventory contention, caching, have been improved greatly improved on recent FP/FEPs
 - ▶ You do not want to lose money in revenue or investment to diagnose and resolve already known issues!



[Recommended fixes and settings for WebSphere Commerce Version 7](#)

Database Maintenance

- Maintaining the health of the database should not be an afterthought, maintain and purge !



[Maintaining a WebSphere Commerce DB2 Database](#)

Failover and Recovery

- When a site is down, getting it back up should be top concern. Ensure failover and recovery options at all tiers, Application, Database, webserver, load balancer, plugin, network











- **Recommended Blog:** [Fail on your own terms : Plug-in failover options](#)



Recommended Blog: [Where is your WebSphere Commerce black box?](#)

Lessons Learned from Holiday 2013



1. Adding **CPU** does not mean add more **webcontainer** threads
 - ▶ Common mistake to get more throughput causes contention or memory issues, consider additional JVMs
2. Don't overlook impact of **Inventory contention**, test with accurate promotions and expected shopper patterns
 -  **Recommended Blog - That's my product! Dealing with inventory contention**
3. Understand your **database connections**
 - ▶ The more connections to the DB server, the slower DB response, which in turn drives even more connections to the DB
 -  **Recommended Blog - Troubleshooting: Database connection pooling issues**
 -  **Recommended Blog - Beware of the Connection storm**
4. Don't max out **ulimit** with excessive SocketReads
5. The **network** is not to be overlooked
6. Shoppers will be impatient, be prepared for **multi-click** tendencies
 -  **Recommended Blog - Locking Orders tables on multclick**
7. Know who is hitting your site and what they are doing
 - ▶ Access logs are helpful, if set up right
 -  **Recommended Blog - Access Logging on Steroids!**
 -  **Recommended Blog - mpmstats: The eye to the site**
8. Proper configuration of **Dynacache invalidation** is critical
 - ▶ It is possible that if invalidations are misconfigured or untuned, the cost replication creates from light performance degradation, to a complete outage.
 -  **Recommended Blog - Avoiding invalidation overload after propagations**
 -  **Recommended Blog - Dynacache/DRS Invalidations**

Reference: Guidance to Isolate Root Cause of Outage

■ Site Health:

- ☐ How do you know the site is down?
 - Alarms and monitors can measure in different ways
 - Monitor in the intranet or extranet? What is the monitor exactly measuring?
 - Can you access the website from your workstation?
- ☐ What is exactly slow in the site?
 - Are all pages slow or some in particular? (eg. catalog pages that are typically cached vs checkout pages)
 - Is whole page slow to render or a portion of it? (eg. HTML is fast but the images and other static content is slow)

■ Timing:

- ☐ Do the servers show the slowness only during peak hours?
- ☐ Does the problem go away during slow periods? (e.g. overnight.. Potential load issue?)
- ☐ Do the servers show the problem at regular intervals? (possible scheduled job?)
- ☐ Does the problem worsen over time? (possible leak?)

■ Server Scope:

- ☐ Are only certain servers affected?
 - If yes, what activity do those servers do that other servers don't ? (e.g. scheduler, MQ, Web Services)
- ☐ Does the problem seem to "jump" from one server to the next?
 - When a problem (e.g. High CPU) is created by a Web request, once the server becomes unresponsive, the request could be failed over to the next server in the plugin-cfg.xml file, thus affecting another server

■ Recovery:

- ☐ Does it recovery on its own accord?
- ☐ Does a restart fix it? For how long? (ie. potential leak)



Reference: JVM Configurations to Consider

- There is no single tuning recommendation Support can provide, but there are various known pain points
- Several configurations that have proven to be major factors influencing site performance and stability
- Accurate, representative, and thorough performance testing is the only way to ensure you have the right configuration
- **JVM Considerations**
 - ▶ Heap size and Nursery size
 - ▶ Garbage collector policy
 - Generational concurrent garbage collector, -Xgcpolicy:gencon.
 - To start specify a value for minimum to 20% of max heap. The maximum size should be 40% of max
- **Webcontainer thread pool Considerations**
 - ▶ The min and max should be equal to reduce the overhead of destroying and creating new threads. Generally speaking, 25 web container threads is a good starting point
 - ▶ Ensure isGrowable is set to false to prevent native memory issues
 - ▶ For multiple processors, start with 5 threads for each CPU.
 - For example: In a 4 CPU system, 20 Web Container threads should be used
 - ▶ Increase max # of threads only if performance testing shows CPU utilization can handle additional concurrent workload
- **Connection Pool setting:**
 - ▶ Use following equation to determine size of DataSource Connection Pool Size:

DataSource Connection Pool Size >=

- + (# Of WebContainer Threads)
- + (# Of WC Scheduler Threads)
- + 1 (for WC Key Manager)
- + 1 (for WC Auditing)
- + (# of Parallel and Serial MQ listener threads)
- + (# of non-WebContainer Threads used by Custom Code)

Holiday Readiness Program: Get on Board



1. [Register](#) to the IBM Industry Solutions Client Success Essentials Community
2. Review the Holiday Readiness documents in the Community
3. Share with IBM Account Team or Representative plans for holiday and activities throughout the year

	<input type="checkbox"/> Products and Levels	<input type="checkbox"/> Parties engaged with client: (IBM Services, AVP, Hosting, BP)
	<input type="checkbox"/> URLs Sites in production	<input type="checkbox"/> Any major issues over 2013 holiday season?
	<input type="checkbox"/> Most recent upgrade	<input type="checkbox"/> Any major issues thus far in 2014, or current/potential roadblocks leading into 2014 holiday season?
	<input type="checkbox"/> Levels ran for 2013 holiday season	<input type="checkbox"/> What specific preparations have been made for holiday? (testing, caching, performance improvements, etc)
	<input type="checkbox"/> Production Code freeze date	
	<input type="checkbox"/> Peak traffic day(s) on site	

4. Choose your PMR Severity based on your **Business Impact**:

Sev	Business Impact	Response Goal	Commerce Example
1	Critical business impact - <u>this conditions requires an immediate solution</u>	Within 2 hours	Unable to start production Commerce Server
2	Significant business impact - <u>program is usable but severely limited</u>	Within 2 business hours	Problems loading new products into catalog
3	Some business impact - program is usable but less significant features impacts	Within 2 business hours	Assistance with custom command implementation
4	Minimal business impact - <u>problem causes little impact or reasonable workaround is in place</u>	Within 2 business hours	How to plan for a migration

1. If any issue with IBM Support is becoming critical, call more attention to your problem using escalation path

1. Contact the Support Analyst (via direct phone, email, or SR) and clarify the business impact of your problem
 - *Off-shift (24x7) Call **'IBM Software Support'** number and ask to speak to the next available technician (<http://www.ibm.com/planetwide/>)
 - Raise the severity level of the problem (PMR)
 - Ask to speak to the Support Analyst's manager to gain prompt attention and management focus
 - * Off-shift (24x7) Call **'IBM Software Support'** and ask to speak to the **"Duty Manager"**

Project Management Tips for Peak

Start now and leverage these project management tips to help increase the level of preparedness during peak traffic days



1. Confirm focals, update contact sheet

- Focals for every key area, contact sheets and named backups

1. Define a support schedule

- Peak days start early and finish late. Create a shift schedule for 24x7 or peak-hour support coverage

1. Setup a communications plan

- How are all the parties kept up to date? Will there be regular status emails? Who is responsible for them? Who are the recipients? What frequency and content is required ?

• Document escalation criteria and procedures

- Educate your team supporting the site on the criteria and procedures for escalations. Also document the escalation procedures for when assistance from an external team is required (e.g. IBM support).

• Ensure activities by the business, performance and operation teams are in sync

1. Setup checkpoints with representatives from all teams to ensure there is full awareness and agreement on the activities. During peak days, this can be covered by the communications plan.

• Ensure the *Runbook* is up to date

1. Document all the activities required for the daily operation of the site. In addition to the points above, tech leads should validate the points of monitoring, alerts and diagnostic data collection, all of which are critical for peak



Recommended Blog: [Project Management Tips for Peak](#)

HELP! It's Black Friday and my site is down!

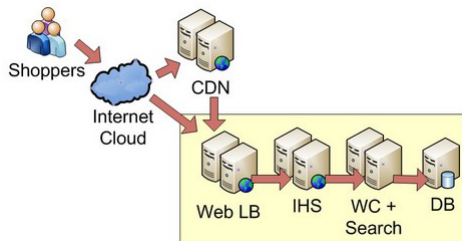


Engage Support if necessary, but worry about getting the site back up in parallel as primary concern
→ *There will be only so much that can be done. Testing, preparation, and a play book are all imperative!*

1. Stay Calm, **follow your plan!**

1. Get your site back up (restart or kill JVMs, rolling restarts if necessary)

1. Consider throttling for damage control, bring stability to overloaded site



"If the site can handle only 50% of the load it's receiving, or otherwise it completely fails/hangs, it is better to handle that 50% than to fail for everybody. For a site experiencing performance problems, such as 100% CPU, or when a 3rd party service is overloaded, throttling can help restore stability."

Throttling is used to offer temporary relief. A complete tuning exercise might be needed to allow the site to handle the complete load on a permanent basis. Also, before restricting site traffic, you should consider other options such as stopping certain marketing and promotional activity." –Andres Voldman

4. Capture logs that already exist on filesystem, and javacores and heapdumps

• Call IBM Support to open a severity 1 PMR, with a realistic expectation of what can be done

1. Call IBM Support to speak to Duty Manager



Recommended Blog: [Throttle for damage control](#)

Additional WebSphere Product Resources

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at:
http://www.ibm.com/software/websphere/support/supp_tech.html
- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at:
<http://www.ibm.com/developerworks/websphere/community/>
- Join the Global WebSphere Community:
<http://www.websphereusergroup.org>
- Access key product show-me demos and tutorials by visiting IBM Education Assistant:
<http://www.ibm.com/software/info/education/assistant>
- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:
<http://www.ibm.com/software/websphere/support/d2w.html>
- Sign up to receive weekly technical My Notifications emails:
<http://www.ibm.com/software/support/einfo.html>



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Questions and Answers

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Easily find important Support resources

- Connect with the Experts
 - ▶ Support Technical Exchanges
 - ▶ Ask the Experts Sessions
- Product Support Newsletters
- Blog & Forums
- Training videos, IEA modules
- Event Readiness
- Proactive Services Offerings
- Essential Links to key sites
 - ▶ IBM Support Portal
 - ▶ Client Success Portal
 - ▶ Fix Central

Welcome to the IBM Client Success Essentials Community!

This community brings together users of Smarter Cities, Smarter Commerce, Smarter Content and Smarter Workforce software to share, collaborate and connect with each other virtually. In this community, you'll find training videos, upcoming events, blogs, important web links, and more. Learn about our [Client Success Mission](#).

Learn and Collaborate:

Find your product in the [Product Directory](#)



Smarter Cities



Smarter Commerce



Smarter Content (ECM)



Smarter Workforce

Leverage Customized Offerings:



Event Readiness

Holiday Readiness, End of Support Outreach, Custom Programs, Remote Installation Assistance



Accelerated Value Program

Helping clients accelerate product adoption and ROI of their IBM software



Proactive Notifications

Sign up for support updates

The following are available to clients, business partners, and IBM employees that have products in Smarter Cities, Smarter Commerce, Smarter Content, and Smarter Workforce. [Click here to learn more.](#)



Proactive Services Offerings



Free Web-Based Trainings

<http://ibm.biz/Client-Success-Essentials>

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