

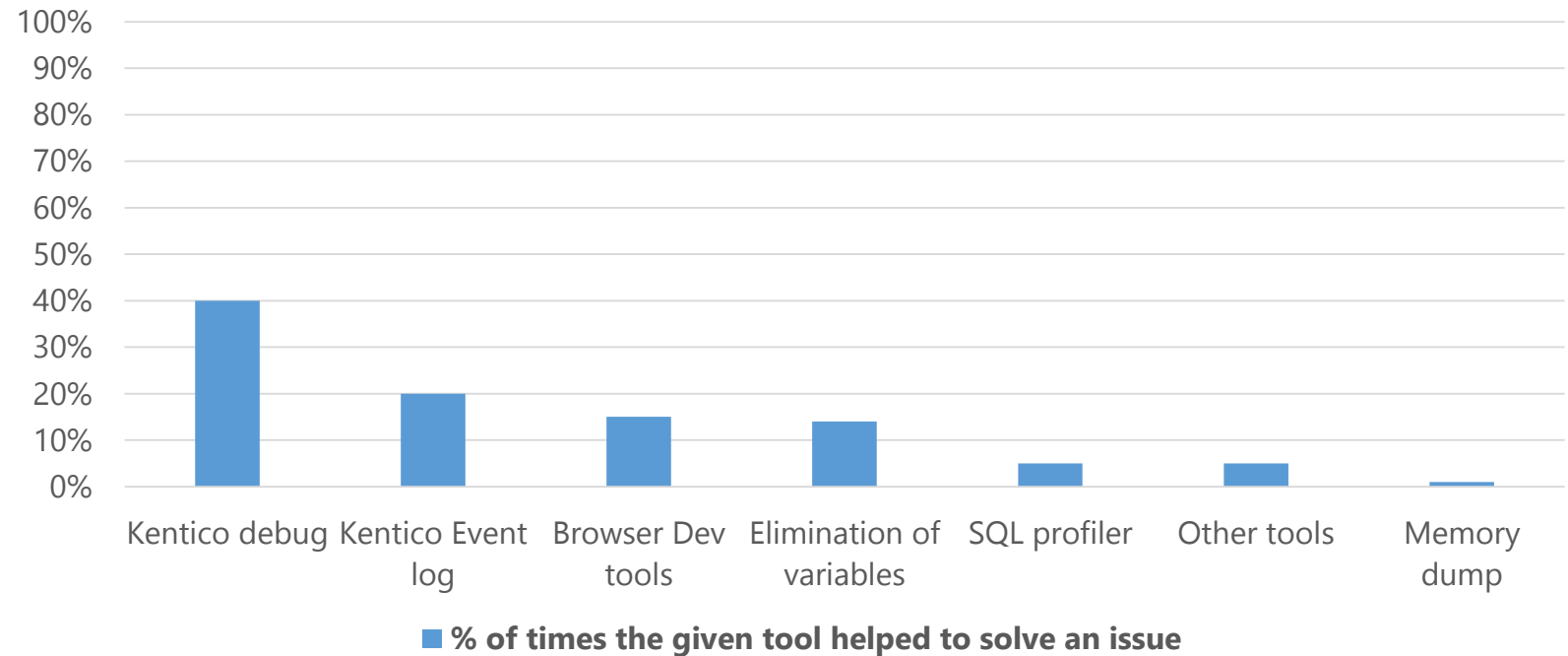
# Optimization and Performance

Bryan Soltis  
Kentico Technical Evangelist

# Why is my site slow?

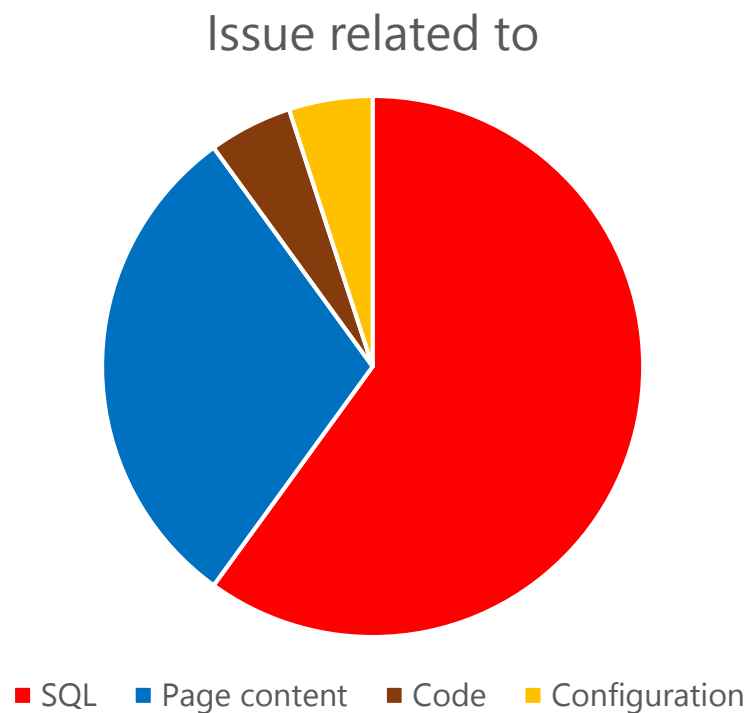
# Pinpointing the issue

- Kentico Event log
- Kentico debugs
- Elimination of variables
- Windows event log
- Visual Studio debug
- Memory dump
- SQL profiler



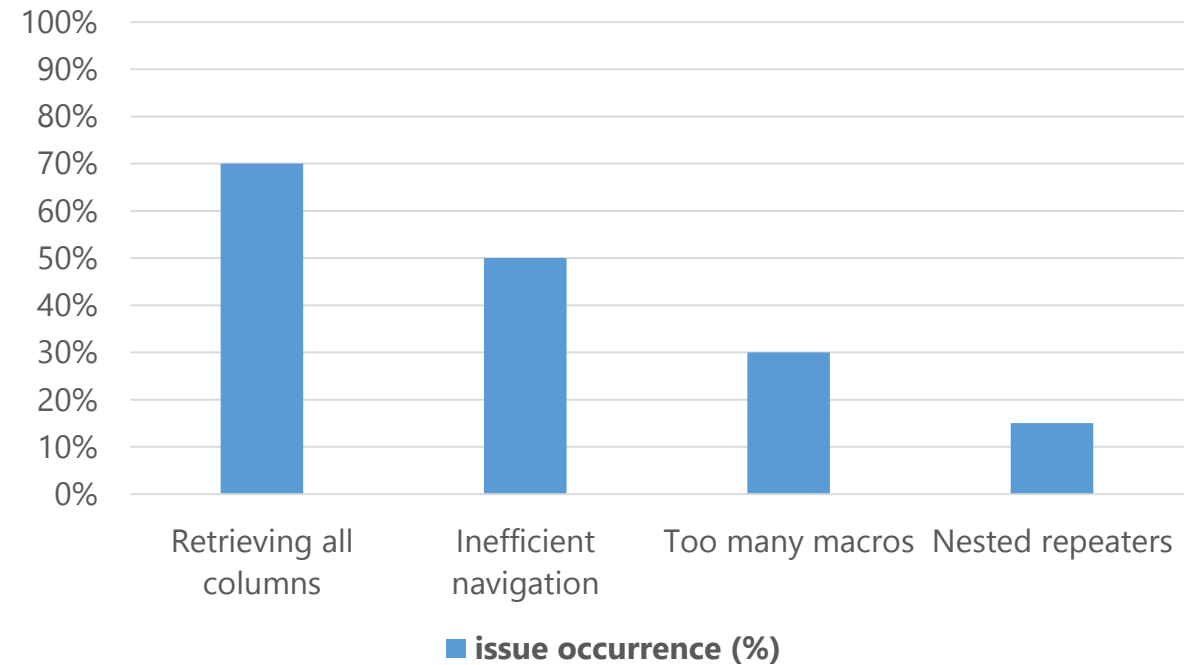
# Performance issue categories

- **SQL**
  - Too many SQL queries
  - Too much data retrieved from the SQL server
- **Page content**
  - Too many requests on a page
  - Too much data on a page
- **Configuration/Architecture**
  - Too much content in the content tree
  - Too much data in the database
- **Code**
  - Inefficient code



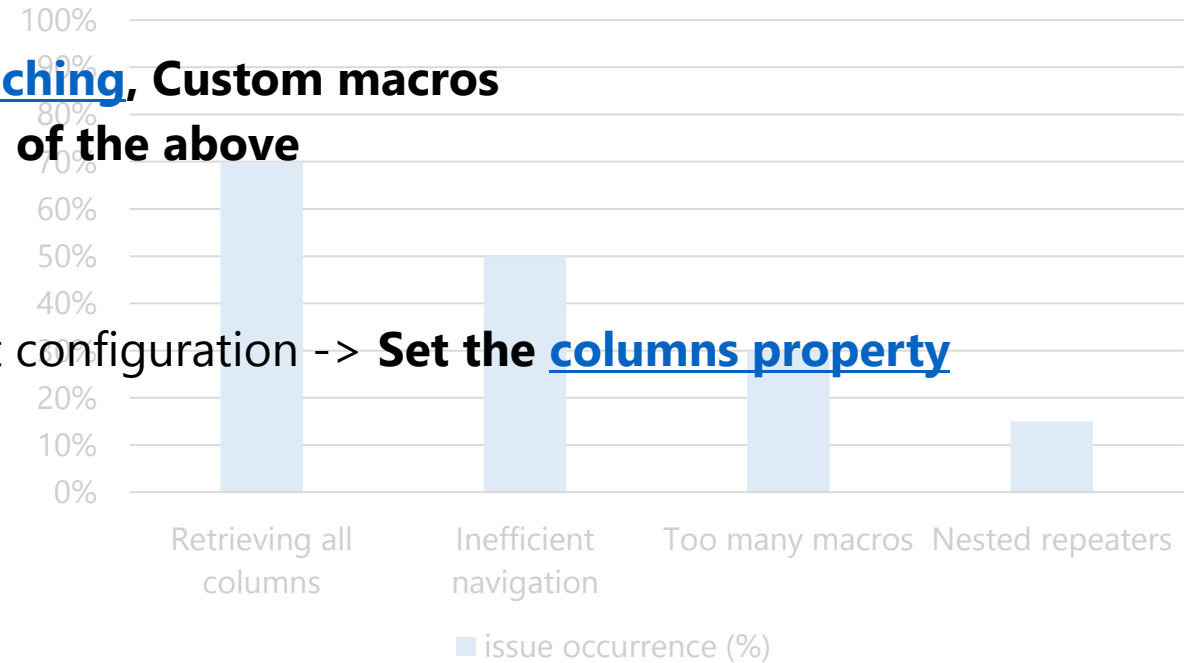
# Category: SQL

- Too many SQL queries
  - Nested repeaters
  - Multiple macros in transformations
  - Inefficient mega menu implementation
- Too much data retrieved from the SQL server
  - Retrieving all columns in code or via web part configuration



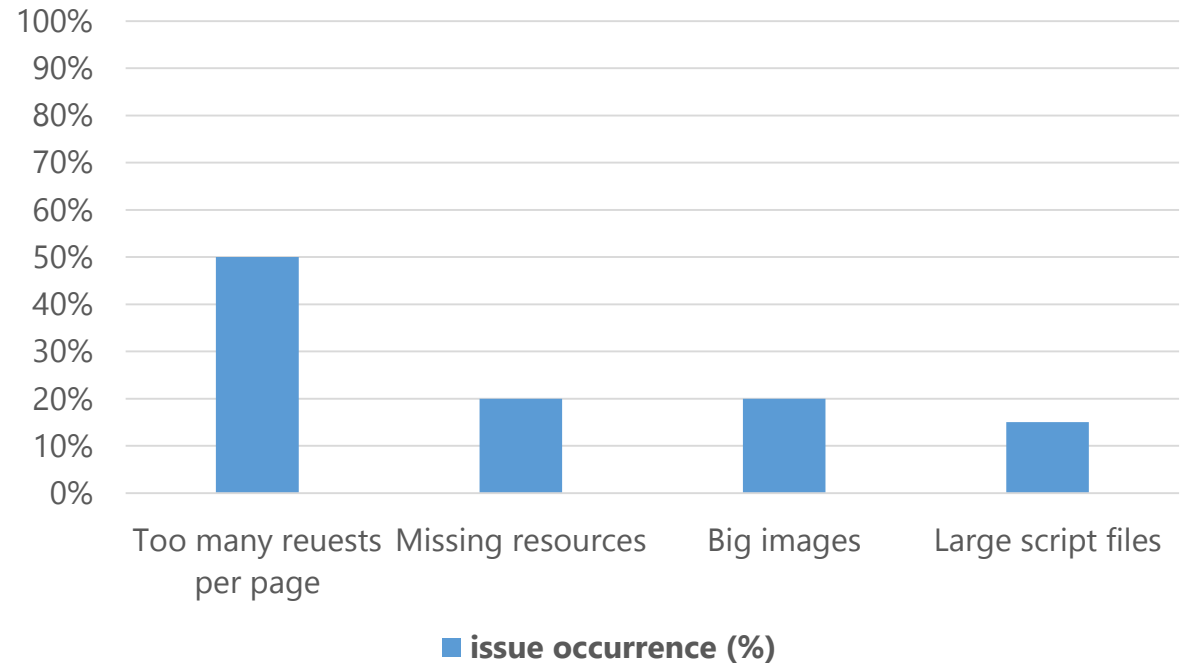
# Tips: SQL

- Too many SQL queries
  - Nested repeaters -> [Hierarchical viewers](#)
  - Multiple macros in transformations -> [Use caching](#), **Custom macros**
  - Inefficient mega menu implementation -> **All of the above**
- Too much data retrieved from the SQL server
  - Retrieving all columns in code or via web part configuration -> **Set the [columns property](#)**



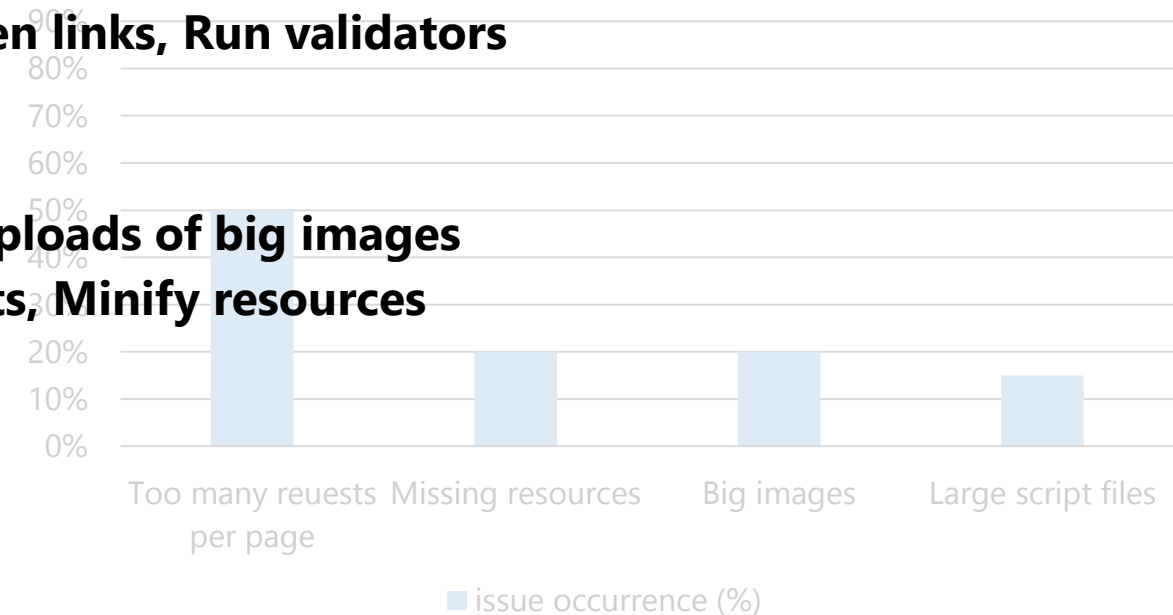
# Category: Page content

- Too many requests on a page
  - 150+ requests per page
  - Missing resources (404 errors)
- Too much data on a page
  - Big images
  - Large script files



# Tips: Page content

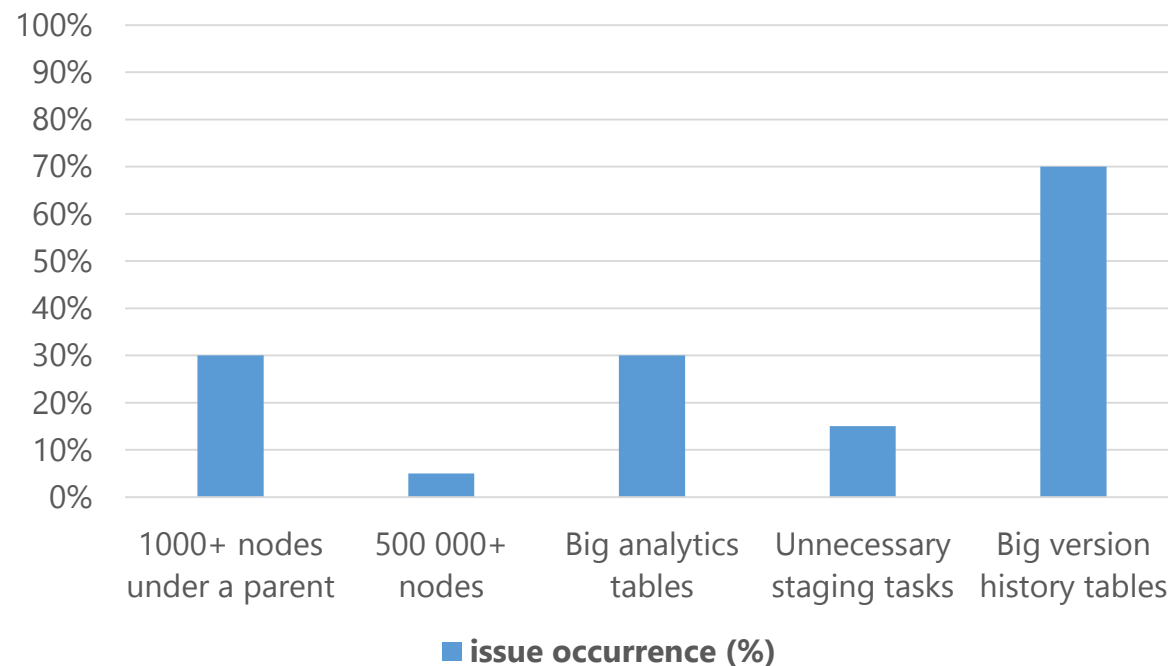
- Too many requests on a page
  - 150+ requests per page -> **Combine resources, Host them on different domains**
  - Missing resources (404 errors) -> **Remove broken links, Run validators**
- Too much data on a page
  - Big images -> **Optimize images, Don't allow uploads of big images**
  - Large script files -> **Remove unnecessary scripts, Minify resources**





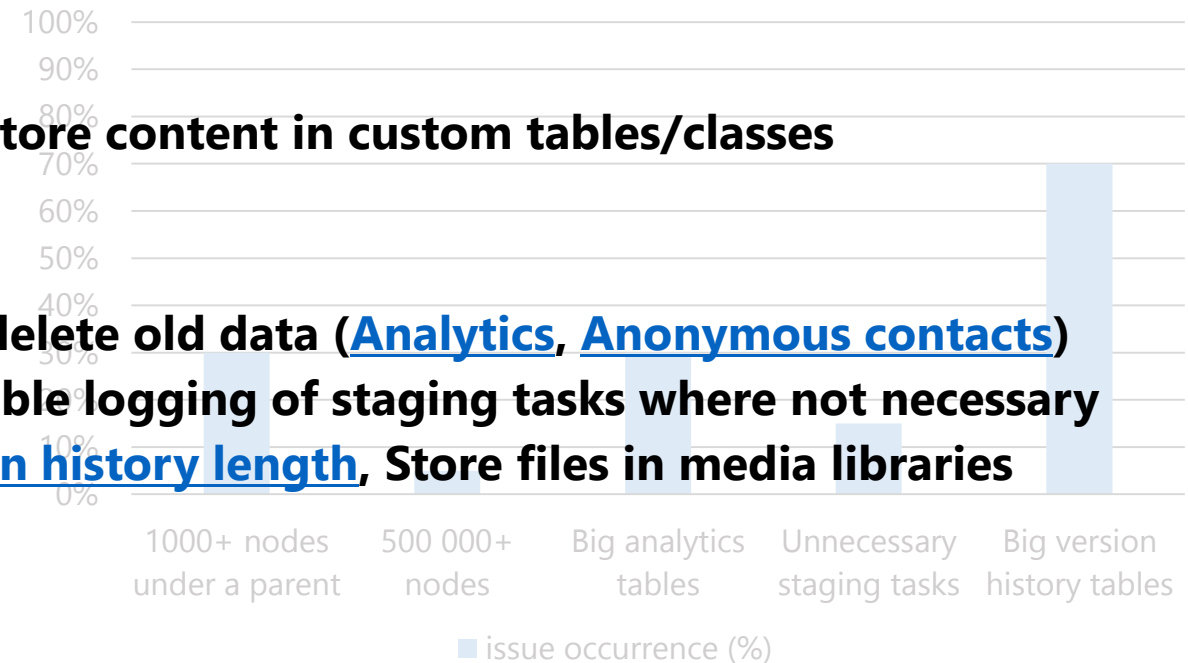
# Category: Configuration/Architecture

- Too much content in the content tree
  - 1000+ nodes under a parent
  - 500 000+ documents in the content tree
- Too much data in the database
  - Big analytics tables
  - Unnecessary logging of staging tasks
  - Big version history tables



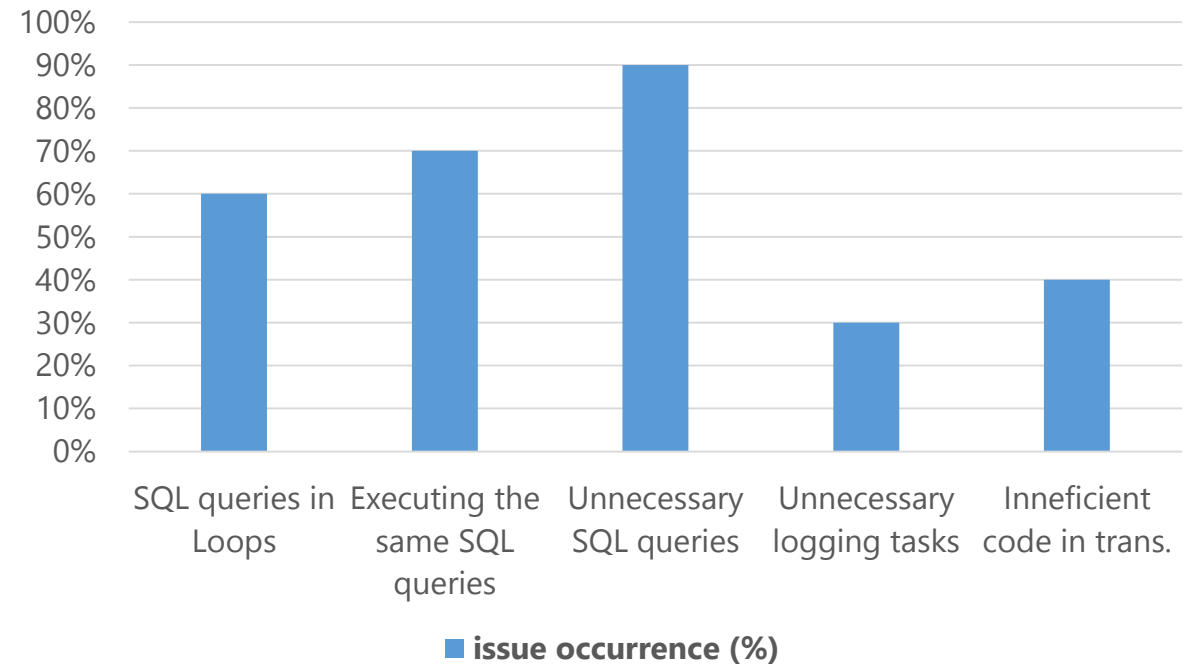
# Tips: Configuration/Architecture

- Too much content in the content tree
  - 1000+ nodes under a parent -> **Set up content business rules**
  - 500 000+ documents in the content tree -> **Store content in custom tables/classes**
- Too much data in the database
  - Big analytics tables -> **Allow the system to delete old data (Analytics, Anonymous contacts)**
  - Unnecessary logging of staging tasks -> **Disable logging of staging tasks where not necessary**
  - Big version history tables -> **Limit the version history length, Store files in media libraries**



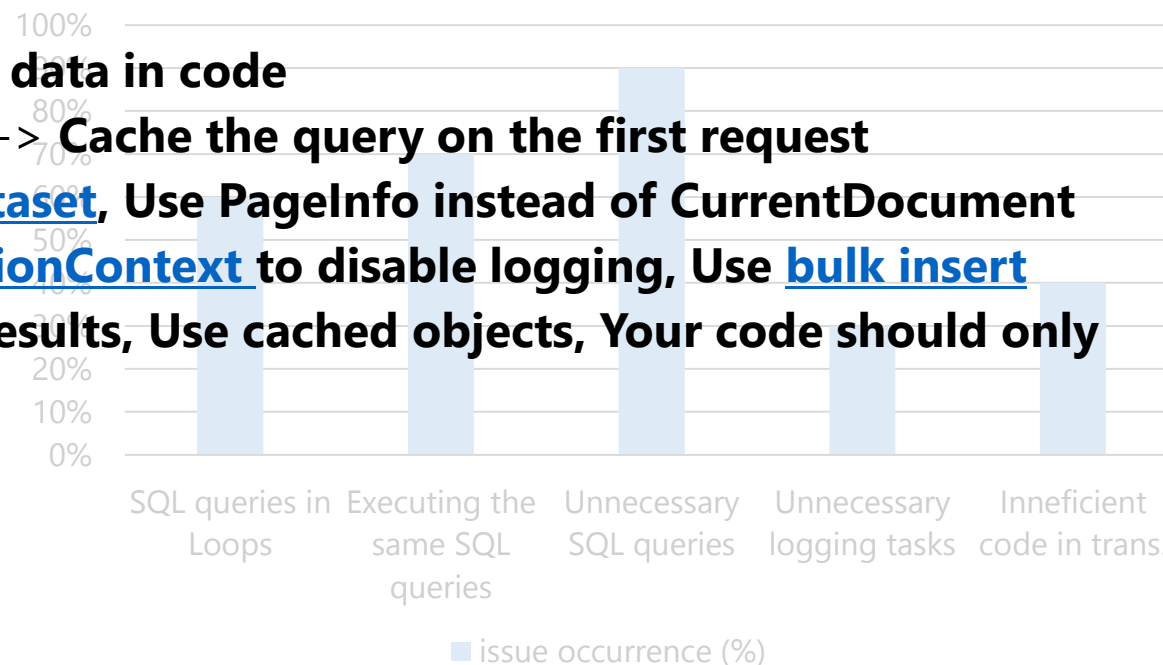
# Category: Code

- Inefficient code
  - Executing SQL queries in loops
  - Executing the same SQL query multiple times
  - Unnecessary SQL queries
  - Unnecessary logging of tasks
  - Inefficient code in transformations



# Tips: Code

- Inefficient code
  - Executing SQL queries in loops -> **Retrieve the data at once and loop thru the data in code**
  - Executing the same SQL query multiple times -> **Cache the query on the first request**
  - Unnecessary SQL queries -> **Use a shared dataset, Use PageInfo instead of CurrentDocument**
  - Unnecessary logging of tasks -> **Use CMSActionContext to disable logging, Use bulk insert**
  - Inefficient code in transformations -> **Cache results, Use cached objects, Your code should only be executed once (scalability)**



# How to prevent most common issues?

- Know the best practices ([Deliver Now Methodology](#))
- Ask support/consulting/the community
- Caching (shared dataset, output cache, caching in custom code)
- Evaluate/Test your implementation
- Master page optimization
- Use the [Roslyn compiler](#)
- Common sense

# Example 1:

- **Issue**
  - Slow products listing page
- **Tool(s) used**
  - Kentico debug
  - Kentico Event log
- **Research result(s)**
  - 500+ SQL queries,
  - Some SQL queries retrieving 17MB+ data
  - Over 15 000 page not found errors in the event log, most of them caused by a missing robots.txt file and missing apple-touch-icon files
- **Solution**
  - Adding missing files and removing broken links
  - Setting the columns property
  - Caching requests and implementing the menu more efficiently

## Page Not Found

```
5863x - /robots.txt - Dec 14 2014 6:33PM
2636x - /payroll/tax/undefined - May 17 2015 5:44PM
2479x - /apple-touch-icon.png - Dec 15 2014 10:40AM
1777x - /apple-touch-icon-precomposed.png - Dec 15 2014 10:40AM
1196x - /[redacted]/Images/anchor.gif
960x - /images/spacer.gif - May 13 2015 8:52AM
933x - /[redacted]/CMSModules/Membership/Pages/Users/PIE.htc - Se
783x - /[redacted]/JavaScript/libs/floatbox/languages/C.js - Feb
706x - /browserconfig.xml - Aug 27 2014 11:05AM
672x - /www.googletagmanager.com/ns.html?id=[redacted] - Sep 15 201
650x - /cookie/search/results.asp - May 13 2015 8:50AM
```

## Example 2:

- **Issue**
  - Slow website, slow page load times
- **Tool(s) used**
  - Kentico debug
  - SQL Management Studio
  - Kinspector
- **Research result(s)**
  - 3.8GB of Activities data (6.9 million activities)
  - 1.6 GB of Contacts data (4.5 million contacts)
- **Solution**
  - Setting up analytics cleanup settings
  - Setting up automate deletion of anonymous contacts

Results		Messages				
	Table_Name	rows	reserved_KB	data_KB	index_size_KB	unused_KB
1	OM_Activity	6950702	4670352 KB	3828792 KB	823792 KB	17768 KB
2	OM_Contact	4592695	2758512 KB	1628288 KB	1124416 KB	5808 KB
3	Analytics_HourHits	8977787	1195248 KB	481648 KB	713336 KB	264 KB
4	Analytics_DayHits	4786032	626352 KB	252288 KB	373760 KB	304 KB
5	CMS_ObjectVersionHistory	59071	374992 KB	351664 KB	19696 KB	3632 KB
6	CMS_EventLog	178494	370944 KB	316104 KB	35144 KB	19696 KB
7	OM_UserAgent	1227851	359328 KB	305648 KB	51664 KB	2016 KB
8	Analytics_WeekHits	2429577	313584 KB	127968 KB	185208 KB	408 KB
9	CMS_Email	232909	215032 KB	146824 KB	26008 KB	42200 KB
10	Export_Task	71602	177848 KB	173344 KB	4016 KB	488 KB
11	OM_PageVisit	5511343	173504 KB	101080 KB	60776 KB	11648 KB
12	Analytics_MonthHits	1201545	157680 KB	63272 KB	93856 KB	552 KB
13	OM_IP	1247938	127072 KB	74008 KB	51008 KB	2056 KB
14		29980	105248 KB	104200 KB	480 KB	568 KB
15	Analytics_Statistics	484851	104072 KB	55448 KB	47000 KB	1624 KB
16	CMS_User	66207	89544 KB	58248 KB	25088 KB	6208 KB
17		57992	87904 KB	86704 KB	376 KB	824 KB
18	Analytics_YearHits	619412	77872 KB	32616 KB	44568 KB	688 KB
19	COM_Customer	39799	77000 KB	33336 KB	37032 KB	6632 KB
20	CMS_DocumentAlias	43604	70272 KB	14456 KB	50824 KB	4992 KB
21	CMS_Document	36413	67976 KB	49648 KB	13080 KB	5248 KB
22	CMS_VersionHistory	23136	65816 KB	45976 KB	7752 KB	12088 KB
23	Newsletter_Subscriber	92373	58376 KB	26272 KB	29728 KB	2376 KB
24	I	232908	49632 KB	48520 KB	280 KB	832 KB
25	CMS_Tree	36458	43728 KB	16112 KB	25424 KB	2192 KB

# Example 3:

- **Issue**
  - Slow website, slow page load times
- **Tool(s) used**
  - Kentico debug
  - Kinspector
- **Research result(s)**
  - 87000+ unprocessed search and 74000+ unprocessed staging tasks in the database
  - The system trying to process the tasks on every request fails
- **Solution**
  - Removing tasks from the database
  - Disabling the logging of staging tasks
  - Fixing the smart search issue causing the tasks not to be processed

Table name	Rows	Size [MB]	Bytes/Row
Media_File	119402	33.757812	296
Analytics_HourHits	92881	6.132812	69
CMS_SearchTask	87662	12.632812	151
Staging_Synchronization	74007	3.132812	44
Staging_Task	74007	857.648437	12151



# Example 4:

## Issue

- Slow website, slow page load times

## Tool(s) used

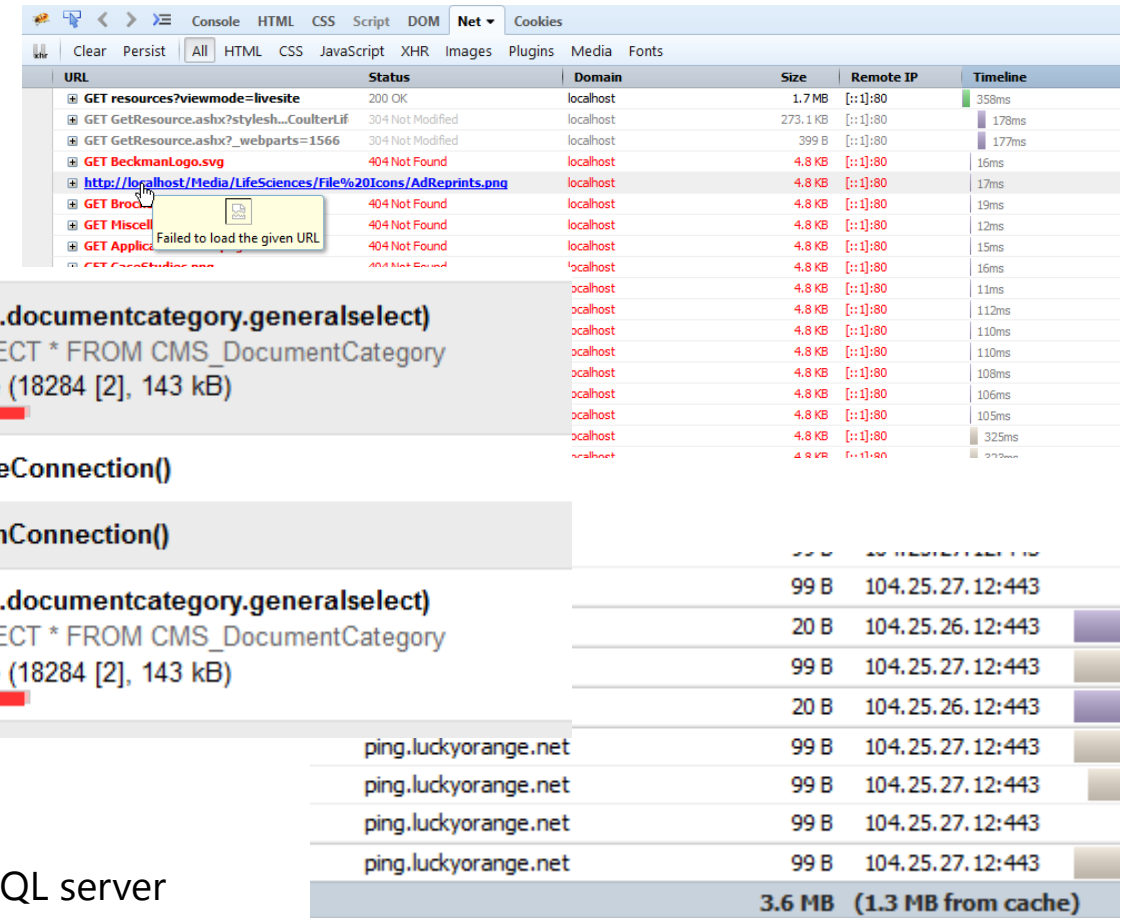
- Kentico debug
- Inspector
- Browser DEV tools
- Eliminating of variables (e.g. output cache)

## Research result(s)

- Macros in menu executed ~700 SQL queries
- 1470 SQL queries per page, 9.8MB data retrieved from the SQL server
- Unnecessary/duplicate SQL queries (around 180 per page)
- 3.6 MB large page

## Solution

- Setting the columns property where possible brought down the retrieved data to 0.8MB
- Caching macros and retrieving the data at once when building listings



The screenshot shows the browser's developer tools with the 'Net' tab selected. It displays a list of network requests, including GET requests for resources like 'resources?viewmode=livesite', 'GetResource.ashx?styleh...CoulterLif', and 'GetResource.ashx?\_webparts=1566'. A red error message 'Failed to load the given URL' is visible for a request to 'http://localhost/Media/LifeSciences/File%20Icons/AdReprints.png'. Below the network tab, the 'Console' tab shows SQL queries executed by the application, including '(cms.documentcategory.generalselect) SELECT \* FROM CMS\_DocumentCategory Table (18284 [2], 143 kB)'. The bottom part of the image shows a table of network requests with columns for URL, Status, Domain, Size, Remote IP, and Timeline.

URL	Status	Domain	Size	Remote IP	Timeline
GET resources?viewmode=livesite	200 OK	localhost	1.7 MB	:::1:80	358ms
GET GetResource.ashx?styleh...CoulterLif	304 Not Modified	localhost	273.1 KB	:::1:80	178ms
GET GetResource.ashx?_webparts=1566	304 Not Modified	localhost	399 B	:::1:80	177ms
GET BeckmanLogo.svg	404 Not Found	localhost	4.8 KB	:::1:80	16ms
http://localhost/Media/LifeSciences/File%20Icons/AdReprints.png	404 Not Found	localhost	4.8 KB	:::1:80	17ms
GET Broc...	404 Not Found	localhost	4.8 KB	:::1:80	19ms
GET Miscell...	404 Not Found	localhost	4.8 KB	:::1:80	12ms
GET Applic...	404 Not Found	localhost	4.8 KB	:::1:80	15ms
GET ...	404 Not Found	localhost	4.8 KB	:::1:80	16ms
...	...	localhost	4.8 KB	:::1:80	11ms
...	...	localhost	4.8 KB	:::1:80	112ms
...	...	localhost	4.8 KB	:::1:80	110ms
...	...	localhost	4.8 KB	:::1:80	110ms
...	...	localhost	4.8 KB	:::1:80	108ms
...	...	localhost	4.8 KB	:::1:80	106ms
...	...	localhost	4.8 KB	:::1:80	105ms
...	...	localhost	4.8 KB	:::1:80	325ms
...	...	localhost	4.8 KB	:::1:80	973ms

SQL Query	Size	Remote IP
(cms.documentcategory.generalselect) SELECT * FROM CMS_DocumentCategory Table (18284 [2], 143 kB)	99 B	104.25.27.12:443
...	20 B	104.25.26.12:443
...	99 B	104.25.27.12:443
...	20 B	104.25.26.12:443
ping.luckyorange.net	99 B	104.25.27.12:443
ping.luckyorange.net	99 B	104.25.27.12:443
ping.luckyorange.net	99 B	104.25.27.12:443
ping.luckyorange.net	99 B	104.25.27.12:443
<b>Total</b>	<b>3.6 MB</b>	<b>(1.3 MB from cache)</b>

# Example 5:

- **Issue**
  - Slow page load times
- **Tool(s) used**
  - Kentico debug
- **Research result(s)**
  - Inefficient transformation code
- **Solution**
  - Caching the result on the first execution

Transformation name:

Transformation type:  [Available transformation methods](#)

```
<%@ Control Language="C#" AutoEventWireup="true" Inherits="CMS.Controls.CMSAbstractTransformation" %>
<%@ Register TagPrefix="cc1" Namespace="CMS.Controls" Assembly="CMS.Controls" %>

<li>
  <a href="#GetDocumentUrl()"><%#Eval("DocumentName")%></a>
  <%# CMS.DocumentEngine.TreeHelper.SelectNodes(ValidationHelper.GetString(Eval("NodeAliasPath"), "")+"/%", true, "CMS.MenuItem",
    "DocumentMenuItemHideInNavigation=0" , "", 1, true).Items.Count > 0 ? "<ul>" : "" %>
  <cms:SubLevelPlaceHolder runat="server" ID="plcSub" />
  <%# CMS.DocumentEngine.TreeHelper.SelectNodes(ValidationHelper.GetString(Eval("NodeAliasPath"), "")+"/%", true, "CMS.MenuItem",
    "DocumentMenuItemHideInNavigation=0" , "", 1, true).Items.Count > 0 ? "</ul>" : "" %>
</li>
```

# After Code Updates?

- Upgrade network
- CDNs
- Web farms
- Cloud
  - Scale Up
  - Scale Out
- Memory dump → Kentico Support / Consulting

# Detection & Prevention

- Health monitoring services
- Event log error email notifications
- Custom reports subscriptions
- 3<sup>rd</sup> party services
- [Regular Maintenance](#)

# Learn More

- [Maintenance in Kentico](http://devnet.kentico.com/articles/maintenance-in-kentico) (<http://devnet.kentico.com/articles/maintenance-in-kentico>)
- [Kentico Deliver now! Methodology](http://download.kentico.com/Kentico_DeliverNow_Methodology.pdf) ([http://download.kentico.com/Kentico\\_DeliverNow\\_Methodology.pdf](http://download.kentico.com/Kentico_DeliverNow_Methodology.pdf))
- [Performance optimization tips](https://docs.kentico.com/display/K8/Optimizing+website+performance) (<https://docs.kentico.com/display/K8/Optimizing+website+performance>)
- [Using caching in custom code](https://docs.kentico.com/display/K8/Caching+in+custom+code) (<https://docs.kentico.com/display/K8/Caching+in+custom+code>)
- [Register performance counters](https://docs.kentico.com/display/K8/Registering+performance+counters) (<https://docs.kentico.com/display/K8/Registering+performance+counters>)
- [Customization best practices](https://docs.kentico.com/display/K82/Best+practices+for+customization) (<https://docs.kentico.com/display/K82/Best+practices+for+customization>)
- [Kinspector](https://github.com/Kentico/KInspector) (<https://github.com/Kentico/KInspector>)
- [Performance Optimization tips](https://docs.kentico.com/display/K9/Optimizing+website+performance) (<https://docs.kentico.com/display/K9/Optimizing+website+performance>)

# Bryan Soltis

E-mail: [bryans@kentico.com](mailto:bryans@kentico.com)

Skype: kentico\_bryans

Twitter: bryan\_soltis

[devnet.kentico.com](http://devnet.kentico.com)

[facebook.com/KenticoCMS](https://facebook.com/KenticoCMS)

[twitter.com/kentico](https://twitter.com/kentico)

[linkedin.com/company/kentico-software](https://linkedin.com/company/kentico-software)