

SharePoint Saturday Cincinnati  
October 27, 2012

# Code Solutions to Improve SharePoint Performance and Scalability via Caching

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Chief SharePoint Evangelist - Idera

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# Questions & Evals



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# ScarePint



## SharePint

SharePoint by day, ScarePint by night

Right here at the UC Bearcat Lounge  
immediately following the closing  
session

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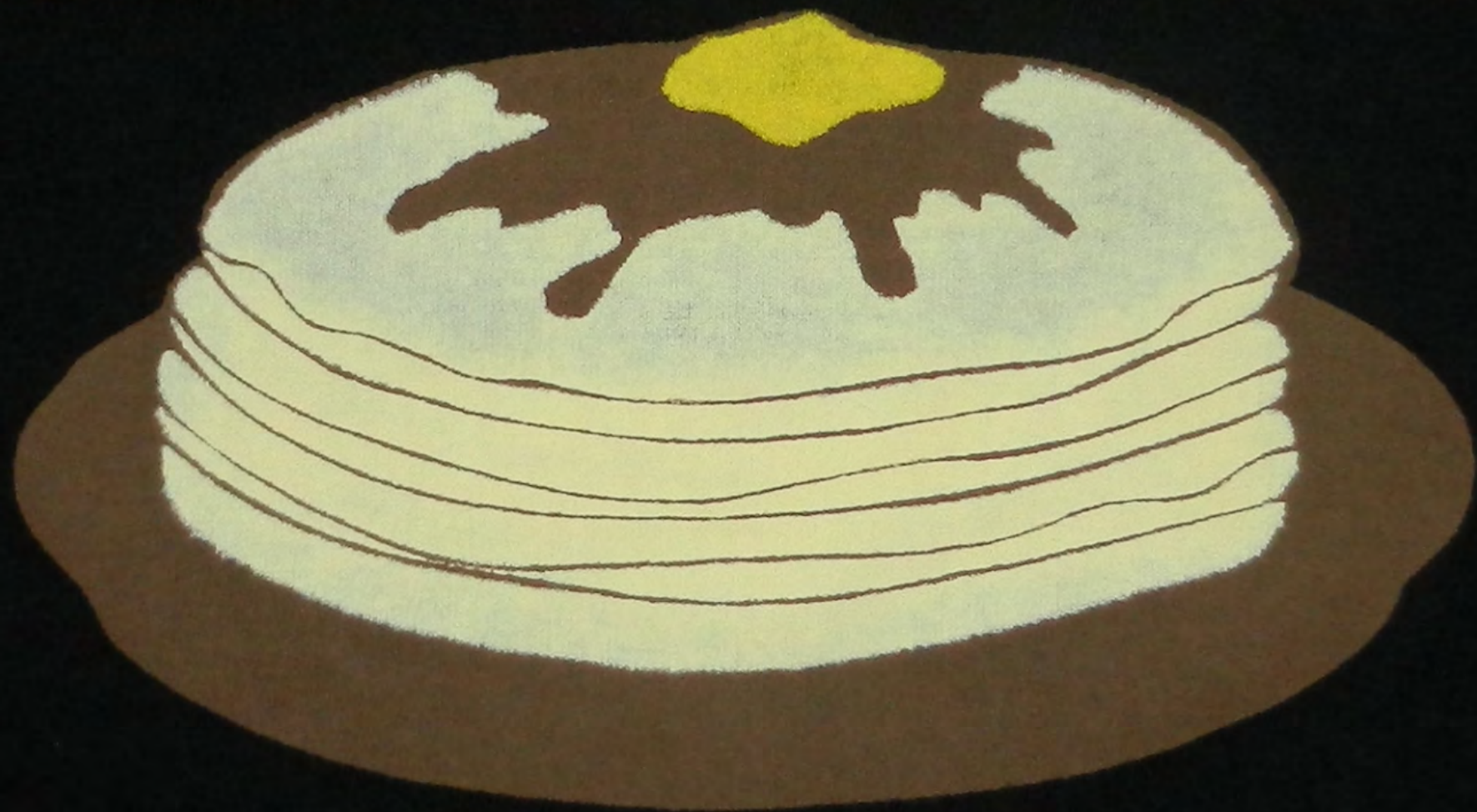
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So, how did this happen?



i'm a  
**Hot Mess**







The culprits





This is what happened  
to me last year ...





# Session Overview

Quick Introduction

Component Caching Options

- ASP.NET Cache, Web Part Cache

Caching for Controls

- Fragment Caching, Post-Cache Substitution

Caching for Pages

- VaryByCustomHandler Implementation

Q&A Throughout

# Why I care about caching



okay ...

Why I



caching

Formerly the architect for a Fortune 25 company's publicly facing SharePoint presence

Highly trafficked environment with about 75,000 page views per hour (peak) in 2009

Averaging (at peak) 1,000 requests/second into IIS

okay ...

Why I



First company of this  
size using MOSS 2007  
for Internet presence



Formerly the architect for a  
Fortune 25 company's publicly  
facing SharePoint presence



with about 75,000 page views  
per hour (peak) in 2009

ak) 1,000 requests/second into IIS



Supported initially with just 2 web  
front ends (WFEs). Eventually  
moved to 4 WFES for growth.

... and finally

I'm sick AND  
tired of hearing  
some people  
complain that  
"SharePoint  
doesn't scale"!!!





# In my experience ...



SharePoint  
scaling and  
performance  
issues are more  
often than not  
due to poorly  
performing  
custom code



due to poorly  
performing  
custom code



What I'm about to  
share might help



Let's get rolling



First up:

# Component-Level Caching





### Home

Dune Life

Giedi Prime Gazette

Mentat Monitor

Spice World

## Welcome Back, Paul!



### Today's Forecast

- Hot and Dry, 120F
- Slight Change of Worms

Right Now: **118F**

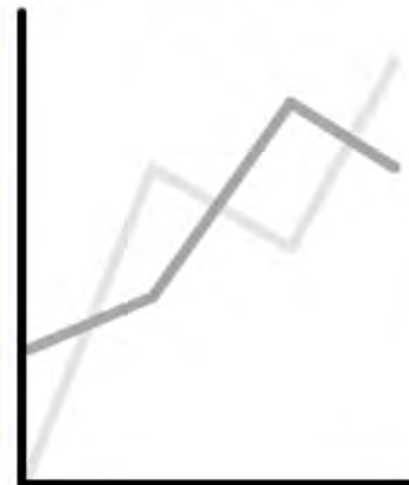


### From Mentat News ...

- It is by will alone I set my mind in motion.
- It is by the juice of Sapho that thoughts acquire speed, the lips acquire stains, the stains become a warning.
- It is by will alone I set my mind in motion.

### Spice Markets

(updated 15:23)

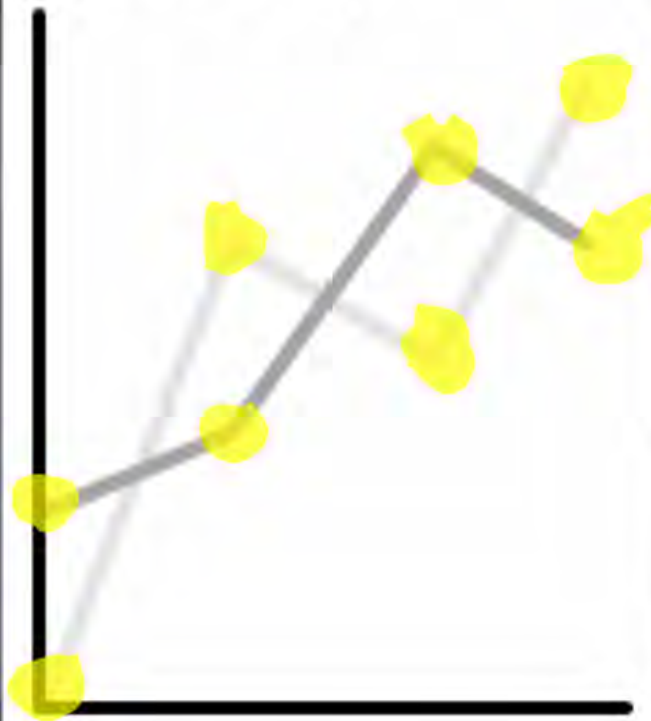


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- Control rendering isn't complicated, but ...
- Data used is "expensive" (computation/latency)
- Need way to store expensive results between calls



- Control rendering isn't complicated, but ...
- Data used is "expensive" (computation/latency)
- Need way to store expensive results between calls

Two possibilities

ASP.NET  
Cache

Web Part  
Cache

# ASP.NET Cache

public sealed class **Cache**  
Member of [System.Web.Caching](#)

**Summary:**  
Implements the cache for a Web application. This class cannot be inherited.

- System.Web.Caching.Cache class
- One instance per application domain
- Basically a key/value object dictionary
- In-memory use and thread-safe\*
- Commonly accessed via Page and HttpContext objects
- Objects can be added with expiration windows, dependencies, & priority values
- Callbacks possible on object removal\*



```

private String GetSomePi()
{
    // Attempt to retrieve a PI value from the ASP.NET Cache
    Object piValue = Cache[PI_VALUE_CACHE_KEY];

    // If the value isn't yet cached, compute it and cache it for later.
    if (piValue == null)
    {
        piValue = PiCalculator.Process(DIGITS_OF_PI_TO_COMPUTE);

        // Insert for indefinite time period
        Cache[PI_VALUE_CACHE_KEY] = piValue;

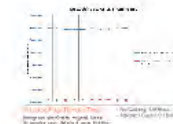
        //// Cache until a specific point in the future
        //Cache.Add(PI_VALUE_CACHE_KEY,
        //    piValue,
        //    null,
        //    DateTime.Now.AddSeconds(15),
        //    Cache.NoSlidingExpiration,
        //    CacheItemPriority.Normal,
        //    null);

        //// Cache for a sliding window of 3 seconds
        //Cache.Add(PI_VALUE_CACHE_KEY,
        //    piValue,
        //    null,
        //    Cache.NoAbsoluteExpiration,
        //    TimeSpan.FromSeconds(3),
        //    CacheItemPriority.Normal,
        //    null);
    }

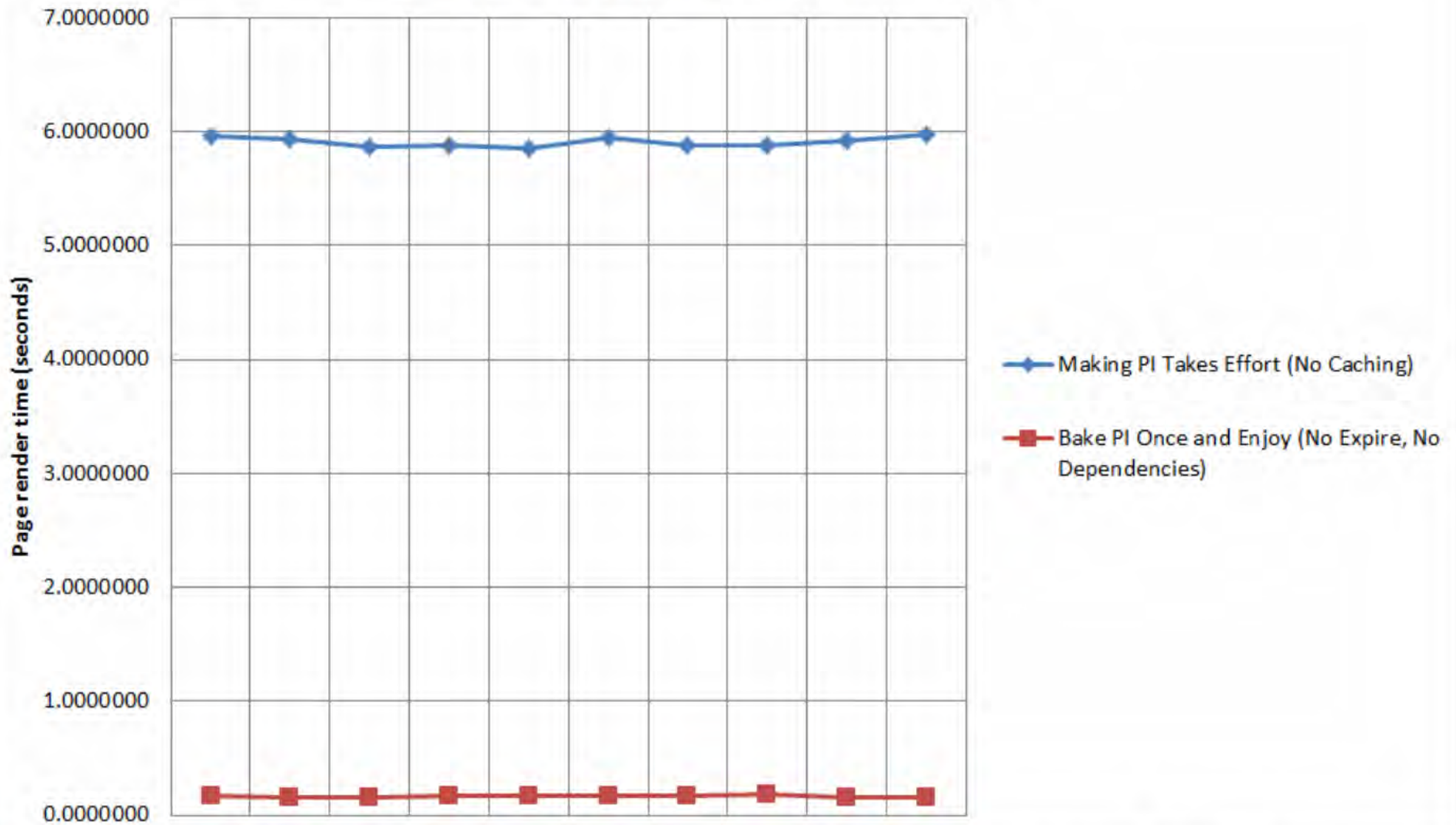
    return piValue.ToString();
}

```

# Demo



## No Caching vs. ASP.NET Cache Use



### Average Page Render Times

Anonymous client-side request times;  
10 samples each obtained using Fiddler

- No Caching: 5.909 sec
- ASP.NET Cache: 0.1641 sec

# Limitations and Watch-Outs

- Not a durable store
- Don't assume something you put in will always be available
- Cache contents not available across WFEs in a load-balanced environment

Sum-up: Safe for general use. Just remember the cache is shared.



# Web Part Cache

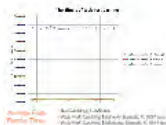
public abstract class **WebPart** : [System.Web.UI.WebControls.WebParts.WebPart](#)  
Member of [Microsoft.SharePoint.WebPartPages](#)

**Summary:**

Provides the base class for creating Windows SharePoint Services Web Parts.

- Available to WebPart derivatives from Microsoft.SharePoint.WebPartPages
- Serializable objects can be cached
- Use PartCacheWrite and PartCacheRead methods to persist/retrieve values
- Can be configured for in-memory or SQL Server-based persistence
- Object expiration can be specified
- Supports shared or per-user caching

# Demo



```
[ToolboxItemAttribute(false)]
[XmlRoot(Namespace="OptimusPrimePart")]
public class OptimusPrimePart : WebPart
{

    // Visual Studio might automatically update this path when you change the Visual Web Part
    private const string _ascxPath = @"~/_CONTROLTEMPLATES/SPMcDonough.CachingCodeSolutions.

    // Backing property variable for max prime to check
    private Int32 _maxValueToCheckForPrime;

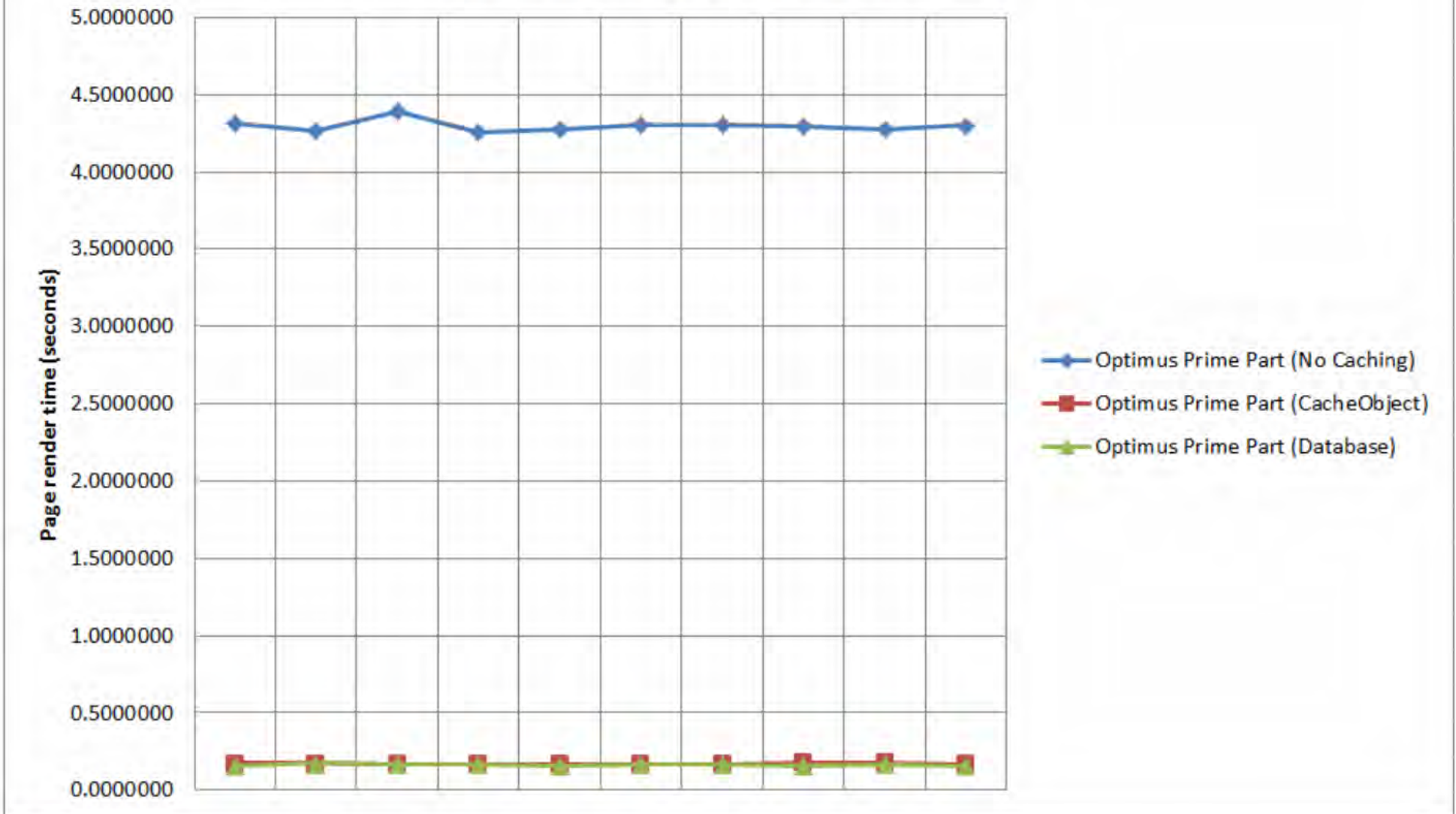
    protected override void CreateChildControls()
    {
        Control control = Page.LoadControl(_ascxPath);
        ((OptimusPrimePartUserControl)control).ParentWebPart = this;
        Controls.Add(control);
    }

    internal String GetSomePrimes(Int32 maxPrimeToFind, Boolean isCacheInUse)
    {
        const String CACHE_KEY = "ComputedPrimes";
        String primeList = String.Empty;

        if (isCacheInUse)
        {
            primeList = this.PartCacheRead(Storage.Shared, CACHE_KEY) as String;
            if (primeList == null)
            {
                primeList = PrimeFinder.FindPrimesUpTo(maxPrimeToFind);
                this.PartCacheWrite(Storage.Shared, CACHE_KEY, primeList, TimeSpan.MaxValue)
            }
        }
        else
        {
            // Straight fetch of the prime values; no caching involved.
            primeList = PrimeFinder.FindPrimesUpTo(maxPrimeToFind);
        }

        return primeList;
    }
}
```

## The Effects of Web Part Caching



## Average Page Render Times

- No Caching: 4.298 sec
- Web Part Caching (Memory-Based): 0.1687 sec
- Web Part Caching (Database-Based): 0.1644 sec



# Limitations and Watch-Outs

- Older and somewhat less friendly way of creating Web Parts (different XML, code separation, and use of a .dwp file)
- Whether or not memory or SQL Server is the backing store is up to your admin
- Somewhat "flaky" in operation

Sum-up: Unless your use-case is specifically addressed, probably best to avoid this type of caching

Next-up:

Control-Level  
Caching





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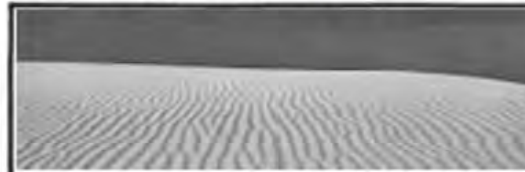
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## Welcome Back, Paul!



### Today's Forecast

- Hot and Dry, 120F
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Right Now: **118F**

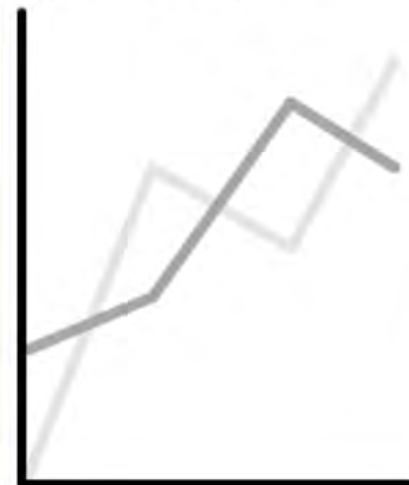


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### Spice Markets

(updated 15:23)







- Control displays static content or ...
- Entire HTML output block generated by control changes infrequently and according to predictable variables/patterns

# Fragment Caching

An easily implemented way to cache the entire block of HTML that is generated by a control

To implement, simply add something like the following to an ASCX control file:

```
<%@ OutputCache Duration="120" VaryByParam="none" %>
```

(Common) options to vary output exist based on:

- HTTP Header
- Query string value (GET) or parameter (POST)
- Value of child control in ASCX



```

<%@ Assembly Name="$SharePoint.Project.AssemblyFullName$" %>
<%@ Assembly Name="Microsoft.Web.CommandUI, Version=14.0.0.0, Culture=neutral, PublicKeyToken=71e9bce11
<%@ Register Tagprefix="SharePoint" Namespace="Microsoft.SharePoint.WebControls" Assembly="Microsoft.Sh
<%@ Register Tagprefix="Utilities" Namespace="Microsoft.SharePoint.Utilities" Assembly="Microsoft.Share
<%@ Register Tagprefix="asp" Namespace="System.Web.UI" Assembly="System.Web.Extensions, Version=3.5.0.6
<%@ Import Namespace="Microsoft.SharePoint" %>
<%@ Register Tagprefix="WebPartPages" Namespace="Microsoft.SharePoint.WebPartPages" Assembly="Microsoft
<%@ Control Language="C#" AutoEventWireup="true" CodeBehind="WeatherRightNowScraper.ascx.cs" Inherits='

<%@ OutputCache Duration="120" VaryByControl="ZipCodeTextbox" %>

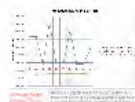
```

```

<asp:Panel ID="MainPanel" runat="server" BorderStyle="Solid" BorderWidth="1px" style="padding: 5px;">
  TIME WHEN CONTROL WAS RENDERED: <asp:Label ID="GenerationTimeLabel" runat="server"></asp:Label>
  <br />
  TIME TO GENERATE HTML OUPUT: <asp:Label ID="TimeToComputeLabel" runat="server"></asp:Label>
  <hr />
  ZIP CODE: <asp:TextBox ID="ZipCodeTextbox" runat="server">45244</asp:TextBox>
  <input id="SubmitButton" type="submit" value="Get Weather" />
  <br />
  <asp:Literal ID="WeatherLiteral" runat="server"></asp:Literal>
</asp:Panel>

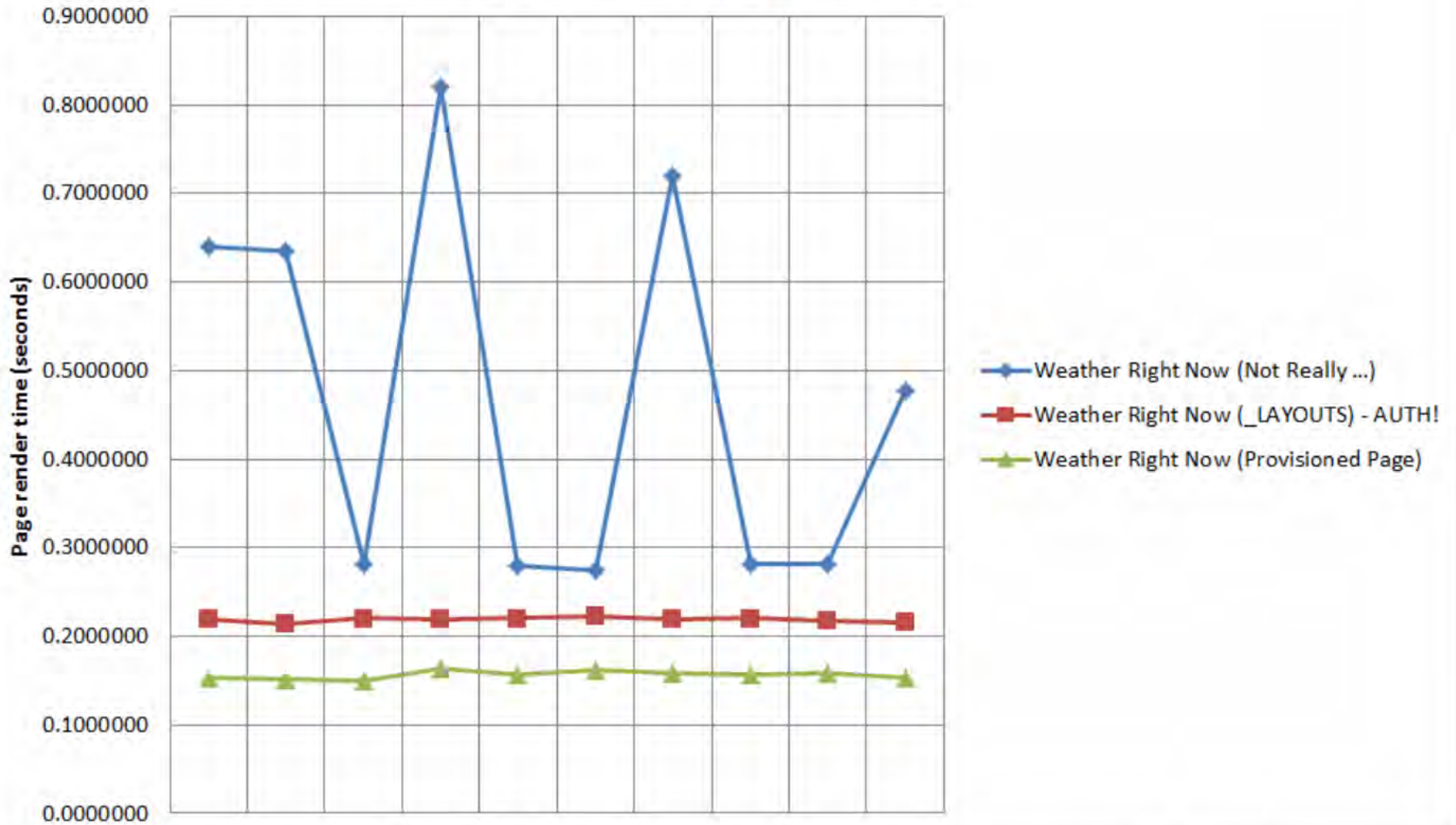
```

# Demo





## Fragment Caching in Controls



## Average Page Render Times

- No Caching (Safe Mode Parsing\*): 0.4691 sec
- Fragment Caching (\_LAYOUTS Page): 0.2187 sec
- Fragment Caching (Provisioned Page): 0.1566 sec

# Limitations and Watch-Outs

- Test your VaryBy... parameter settings carefully
- If using both page-level and control-level caching, page-level will trump control-level (duration) settings
- If caching doesn't appear to work, consider that the safe mode parser may be engaged. Work around it with a provisioned page, \_layouts page, or another (safe) alternative

Sum-up: Safe way to cache control content that changes infrequently



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### Home

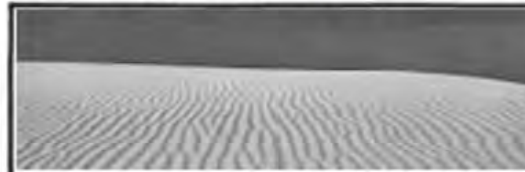
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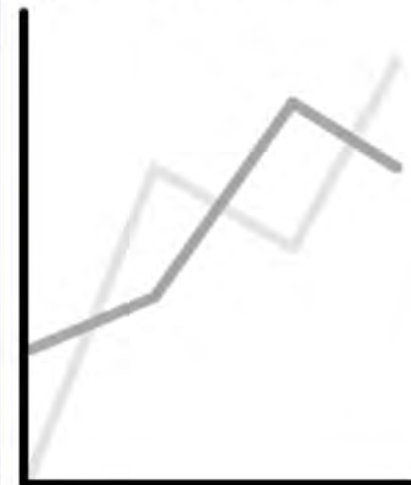


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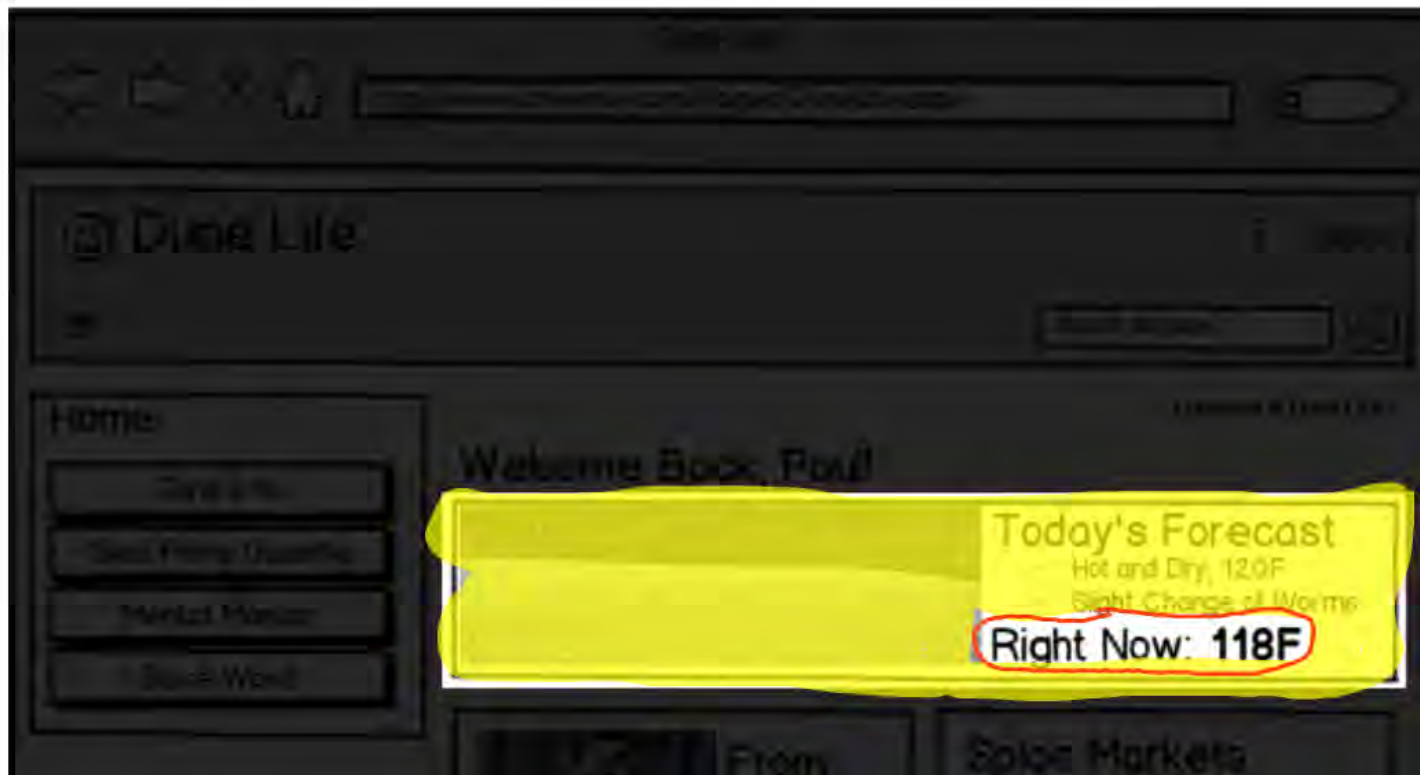
### Spice Markets

(updated 15:23)

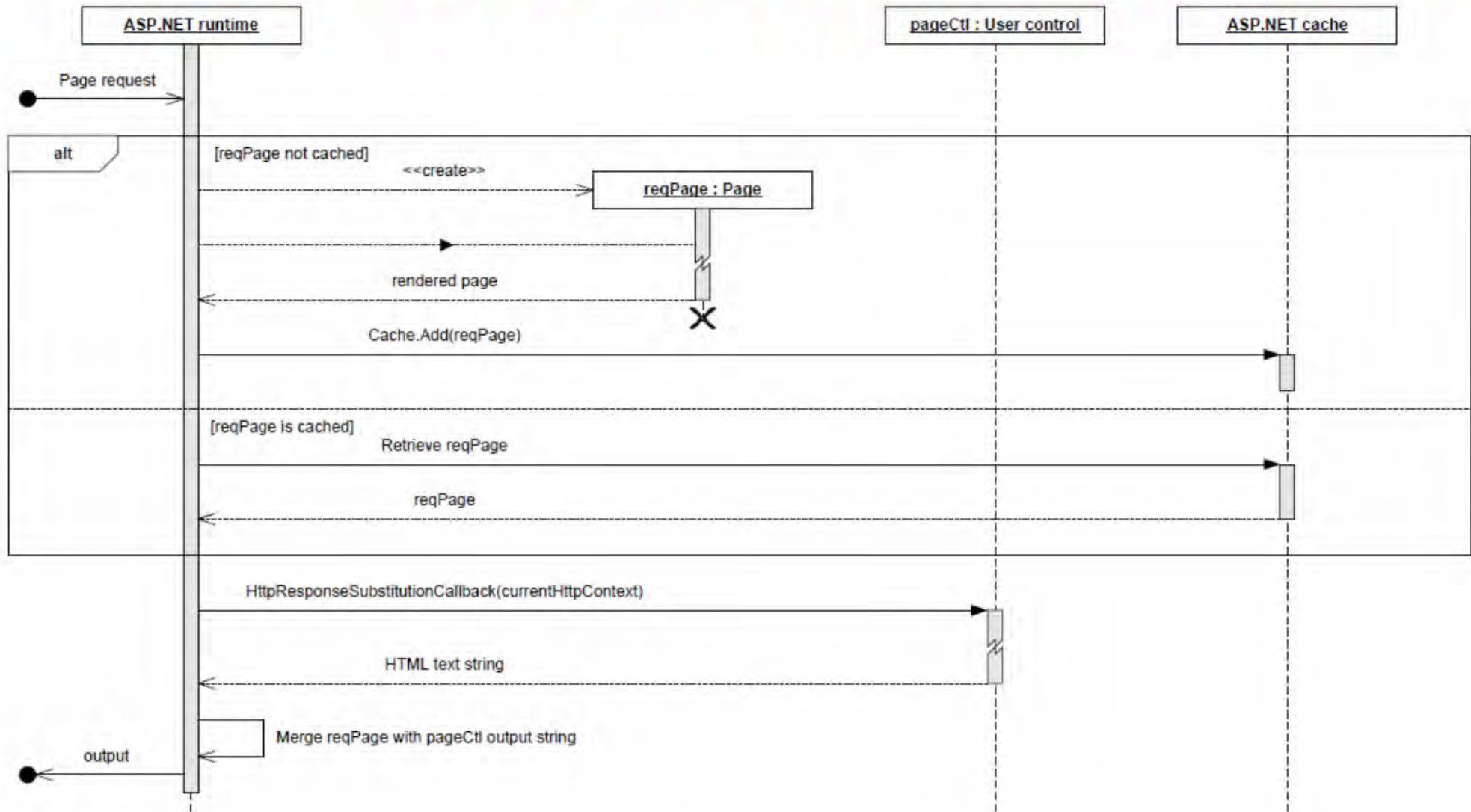




- You are leveraging page output caching (i.e., the entire page's HTML output gets cached)
- Your control contains a mix of static and dynamic content
- You need a way to update the dynamic part (e.g., the "Right Now" temperature)

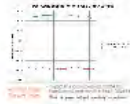


# Post-Cache Substitution



Page output caching "with benefits"

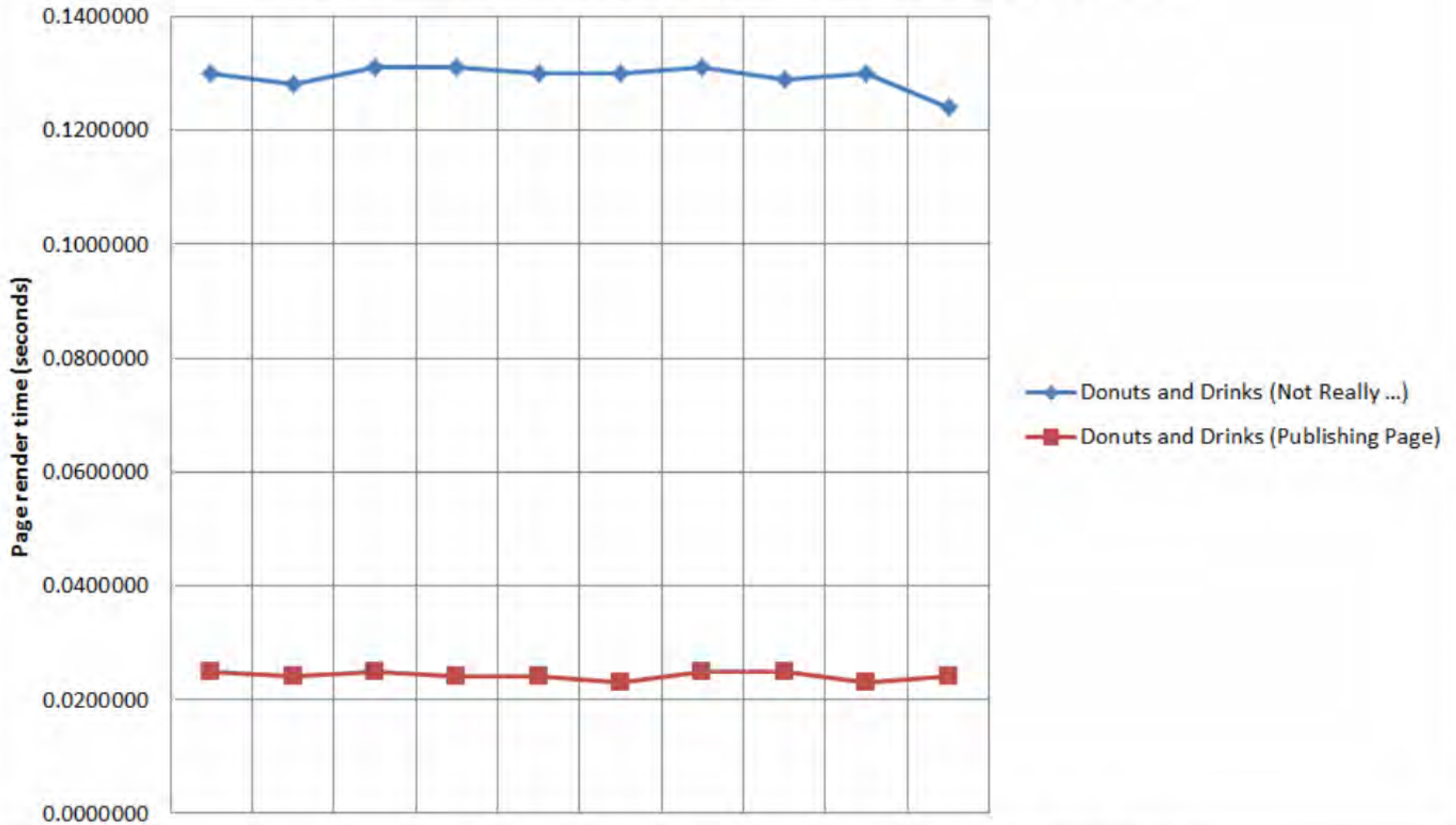
# Demo



```
<asp:Panel ID="MainPanel" runat="server">
  <div style="text-align: center">
    <h2>Donut Caching: Now with Beverage!</h2>
  </div>
  <div style="position: relative;">
    <div style="float: left; width: 50%; text-align: center;">
      
      <table style="font-family: Arial, Helvetica, sans-serif; text-align: center; width: 100%">
        <tr>
          <td>
            Enjoy a tasty donut and ...
          </td>
        </tr>
        <tr>
          <td>
            Prepared at <asp:Label runat="server" ID="DonutPreparedLabel"></asp:Label>
          </td>
        </tr>
      </table>
    </div>
    <asp:Substitution runat="server" ID="BeverageSubstitution" MethodName="GetBeverageHtmlBlock" />
  </div>
</asp:Panel>
```



## Post-Cache Substitution with Page Output Caching



## Average Page Render Times

- Page Output Cache Disabled: 0.1294 sec
  - Post-Cache Substitution (Pub Page): 0.0240 sec
- This is page output caching in action!*

# Limitations and Watch-Outs

- Remember that page output caching needs to be enabled to make this technique useful
- If caching isn't working at all, use the Debug Cache Information option to determine if the host page is being output cached
- Obscure issue: if you override rendering at the page level (e.g., within the master page), post-cache substitution will break

Sum-up: Great complement to page output caching for controls that contain some dynamic content

Heading into  
home:



Customizing Page  
Output Caching





### Home

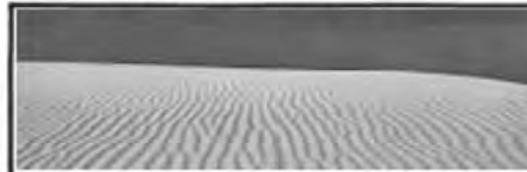
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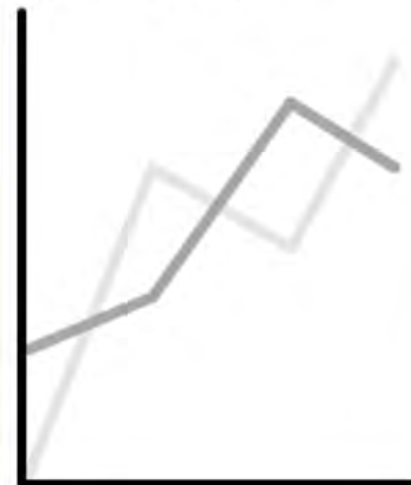


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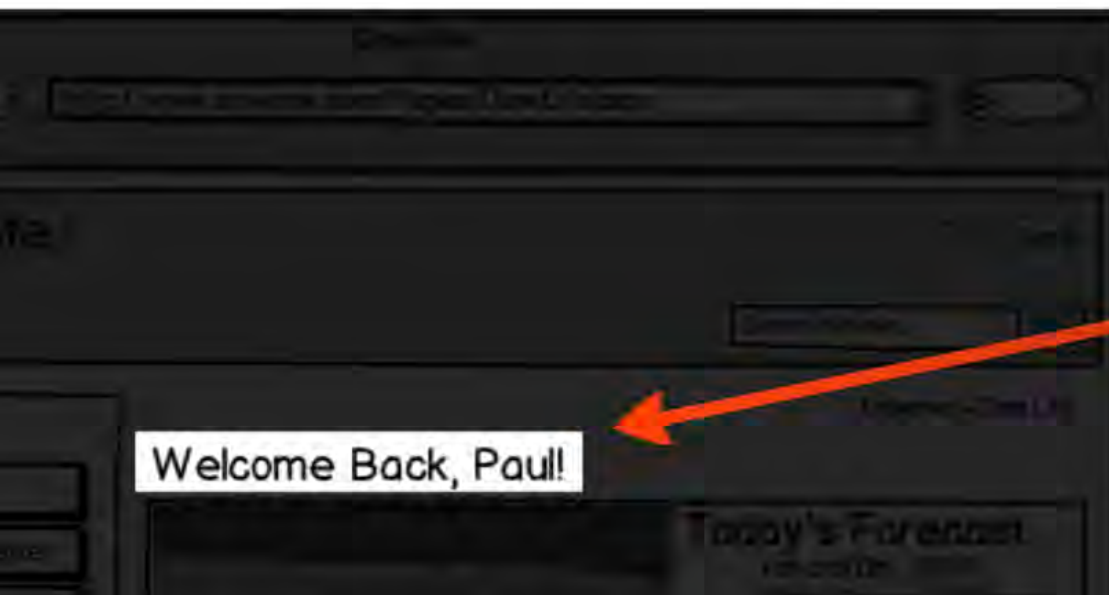
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### Spice Markets

(updated 15:23)



- You need a way to more granularly control SharePoint's page output caching, or ...
- You need a way to alter page output caching from a key generation, object (page) lookup, or object storage perspective, or ...
- You want to affect output caching changes through SharePoint plumbing (w/o controls)



Conditionally  
include or  
exclude full  
page from page  
output cache

# I VaryByCustomHandler

- Exposes one method for our use: the `GetVaryByCustomString` method
- Method gets called during `ResolveRequestCache` and `UpdateRequestCache` event stages
- You supply a return string that gets built into the key that is used to partition pages in the cache.
- You have additional levels of control, such as the ability to disable output caching.



# Implementation Process

- Create a class that derives from SPHttpApplication and implements both IHttpModule and IVaryByCustomHandler\*
- Register the derived class for notifications using RegisterGetVaryByCustomStringHandler
- Build detection & caching logic into the GetVaryByCustomString method\*
- Use a FeatureReceiver to register the class as an IHttpModule with help from the SPWebConfigModification type

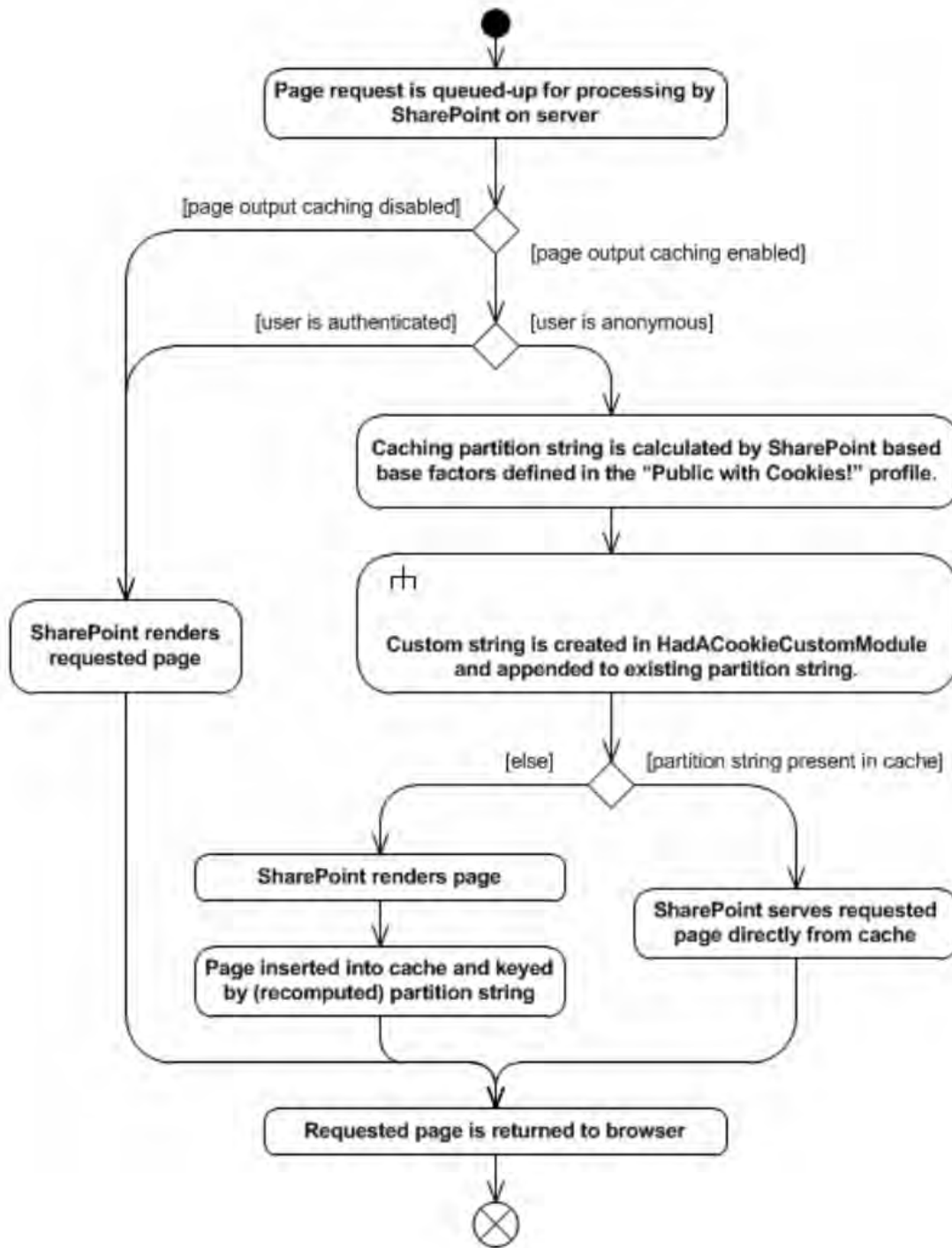
↖ \*

Ignore the MSDN sample  
directing you to modify  
the Global.ASAX file

PERFORM ACE CHECK	NO
Enabled	Yes
Duration	120
Check for Changes	No
Vary by Custom Parameter	Browser, HadACookieCustomCaching
Vary by HTTP Header	
Vary by Query String Parameters	
Vary by User Rights	No

"Vary by Custom Parameter"  
in your output cache profile  
activates the handler!

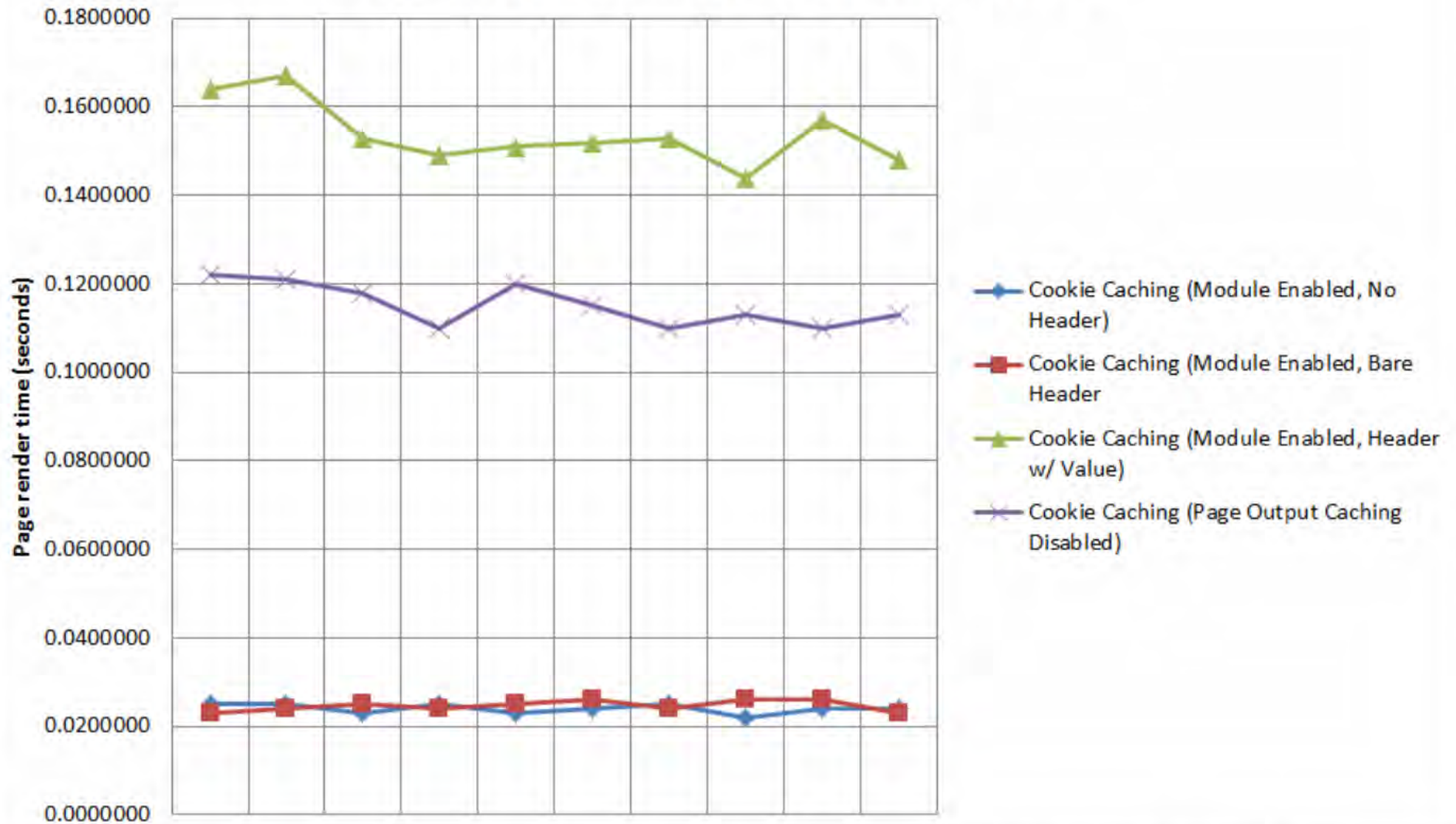




**Demo**



## Page Output Caching and Customization



## Average Page Render Times

- No Page Output Caching: 0.1152 sec
- With Page Output Caching: 0.0243 sec
- Actively Disabling Caching: 0.1538 sec !!!!

# Limitations and Watch-Outs

- Don't forget to include the "Vary by Custom Parameter" in your cache profile - and check for it in the `GetVaryByCustomString` method
- If your code isn't getting called, ensure the `HttpModule` is properly wired-up
- Remember that `GetVaryByCustomString` can be called twice in a single page request: once for lookup, and second for cache insertion\*
- Avoid any costly or long-running operations in your `GetVaryByCustomString` method

*Sum-up: The nuclear option. In my experience, this is a last resort - not the place to actually start*



U\*  
rce  
U

Second call (for insertion) only happens when page is being rendered - either on initial insert or re-rendering following ejection (cache time elapsed)

# References

## Cache Class (System.Web.Caching)

<http://msdn.microsoft.com/en-us/library/system.web.caching.cache.aspx>

## Web Parts and Caching

[http://msdn.microsoft.com/en-us/library/dd585600\(v=office.11\).aspx](http://msdn.microsoft.com/en-us/library/dd585600(v=office.11).aspx)

## Web Part Caching Options, How To Choose

<http://blogs.msdn.com/b/modonovan/archive/2005/04/27/412505.aspx>

## How To Perform Fragment Caching in ASP.NET by Using Visual C#.NET

<http://support.microsoft.com/kb/308378>

## OutputCacheParameters Class

[http://msdn.microsoft.com/en-us/library/ms153449\(v=vs.90\)](http://msdn.microsoft.com/en-us/library/ms153449(v=vs.90))

## Pages, Parsing, and Safe Mode

[http://msdn.microsoft.com/en-us/library/gg552610.aspx#BKMK\\_PagesUI](http://msdn.microsoft.com/en-us/library/gg552610.aspx#BKMK_PagesUI)

## Dynamically Updating Portions of a Cached Page

[http://msdn.microsoft.com/en-us/library/ms227429\(v=vs.90\).aspx](http://msdn.microsoft.com/en-us/library/ms227429(v=vs.90).aspx)

## Substitution Class

[http://msdn.microsoft.com/en-us/library/system.web.ui.webcontrols.substitution\(v=vs.90\).aspx](http://msdn.microsoft.com/en-us/library/system.web.ui.webcontrols.substitution(v=vs.90).aspx)

# References

How to: Extend Caching by Using the VaryByCustom Event Handler in SharePoint Server 2010 (ECM)

<http://msdn.microsoft.com/en-us/library/ms550239.aspx>

When Page Output Caching Does Not Output

<http://todd-carter.com/post/2012/01/31/When-Page-Output-Caching-Does-Not-Output.aspx>

Fiddler Web Debugger - Script Samples

<http://www.fiddlertool.com/Fiddler/dev/ScriptSamples.asp>

Html Agility Pack

<http://htmlagilitypack.codeplex.com/>





# SEAN P. McDONOUGH

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