

# Code Solutions to Improve SharePoint Performance and Scalability via Caching

Sean McDonough

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**SharePoint**  
*intersection*



**Office 365**  
*intersection*

# Code Solutions to Improve SharePoint Performance and Scalability via Caching

*@spmcDonough on Twitter  
(for heckling purposes)*



Sean P. McDonough  
Microsoft MVP (Office Development, Office Servers & Services)  
Chief Technology Officer  
PAIT Group



# Session Overview

Quick Introduction

Component Caching Options

- ASP.NET Cache
- Distributed Caching with Redis

Caching for Controls

- Fragment Caching
- Post-Cache Substitution

Q&A Throughout

# Why I care about caching

okay ...

Why I



catching

okay ...

Why I



catching

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

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

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



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

k) 1,000 requests/second into IIS



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

... and finally

... 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

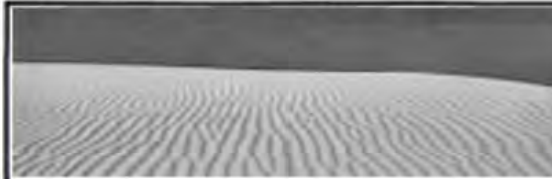
Dune Life

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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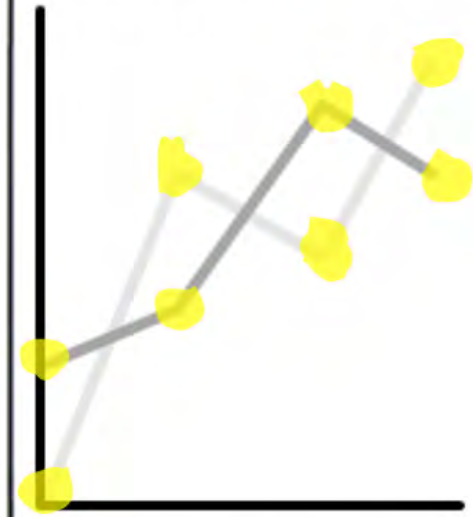


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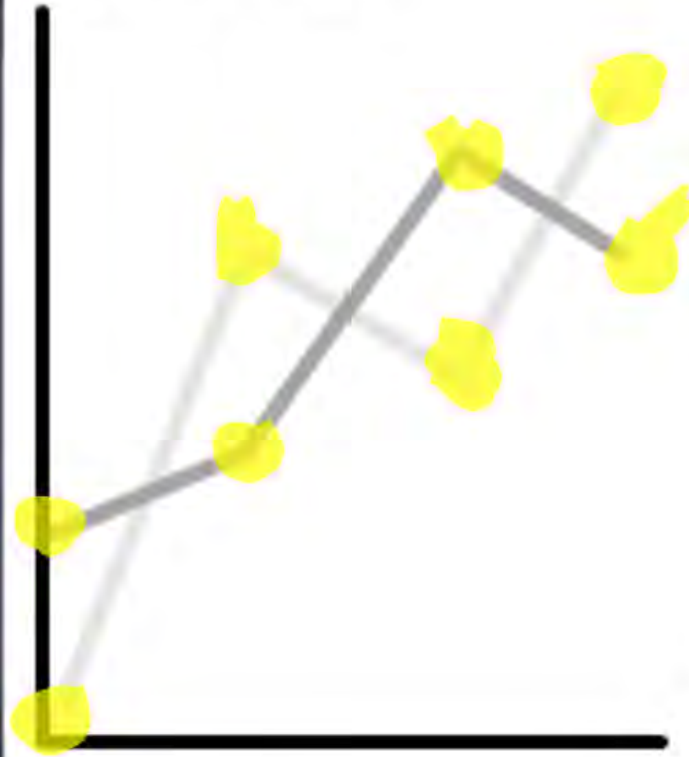


From  
Mentat  
News

It is by will alone I set  
my mind in motion  
It is by the juice of  
Sopho that thoughts  
acquire speed, the lips  
acquire stims, the  
stims become a  
warning  
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my mind in motion

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(updated 15:23)



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

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- Data used is "expensive" (computation/latency)
- Need way to store expensive results between calls

Two real options

ASP.NET  
Cache

Distributed  
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;

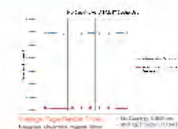
        //// Cache until a specific point in the future
        //Cache.Add(PI_VALUE_CACHE_KEY,
        //    piValue,
        //    null,
        //    DateTime.Now.AddSeconds(15),
        //    Cache.NoSlidingExpiration,
        //    CacheItemPriority.Normal,
        //    null);

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

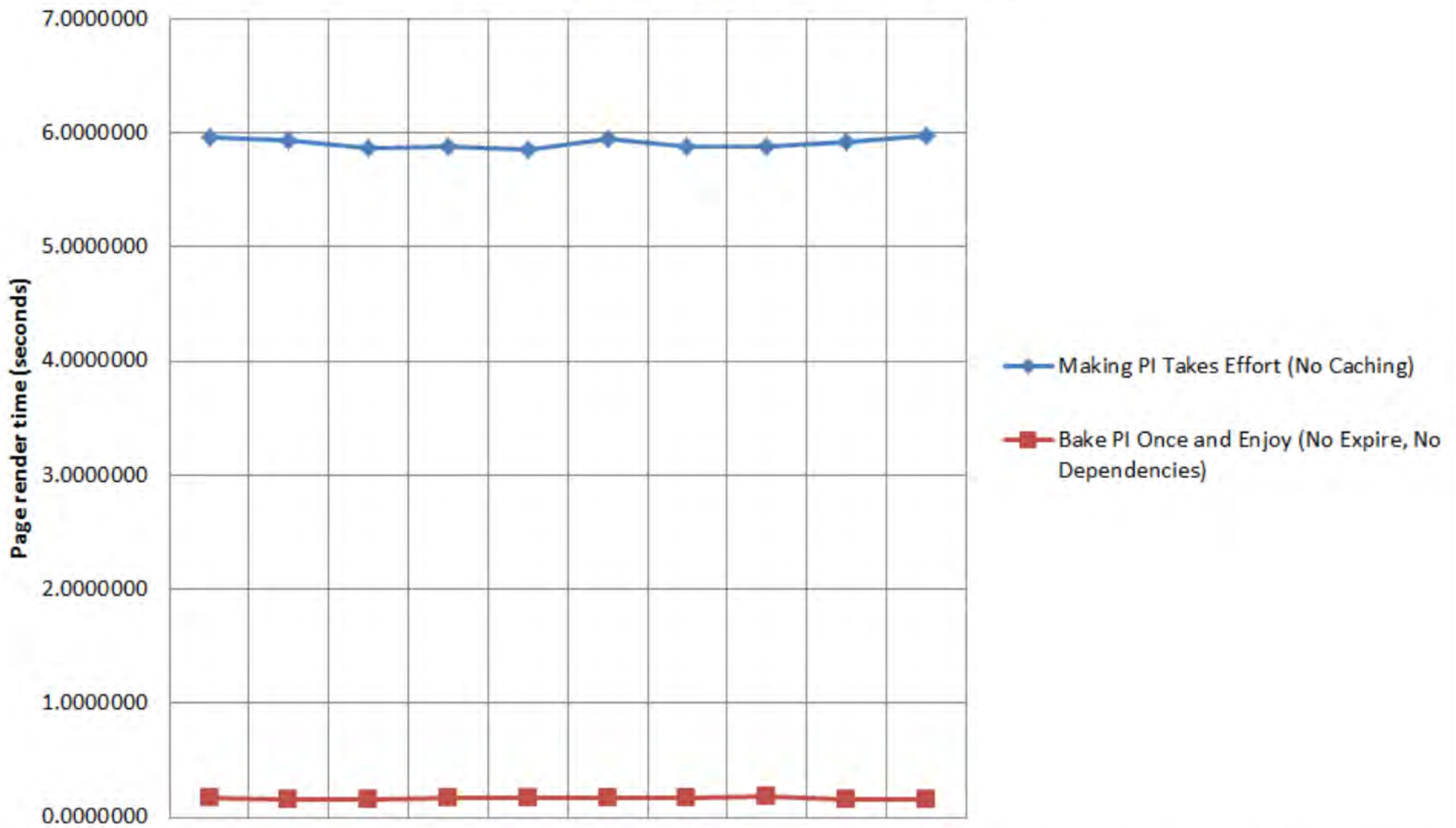
    return piValue.ToString();
}

```

# 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.

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

Two real options

ASP.NET  
Cache

Distributed  
Cache



# Distributed Cache

- Microsoft AppFabric (1.1) for Windows Server
- Provides highly available distributed caching
- Exists independent of SharePoint (and thus will work with any version of SharePoint)
- From a code perspective, very similar to writing code for the ASP.NET (local) cache
- Requires significant external configuration and setup, so you'll want to become good friends with your SharePoint administrators

# Redis

## Distributed Cache

- Redis is an open source (free!), in-memory data structure store
- Can be used as a database, cache, message broker, and more
- Easy to set up (unlike AppFabric) and administer; also good (also free) tooling
- Easy to write code for (numerous client libraries) and integrate with your solutions

1 reference

```
private String GetSomePi()
{
    String piValue;

    // Set up the Redis client for cache item retrieval (and possible insertion)
    using (RedisClient redisCache = new RedisClient(REDIS_SERVER))
    {

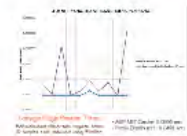
        // Attempt to retrieve a PI cache item from the Redis Cache
        Object piValueCacheItem = redisCache.Get<String>(PI_VALUE_CACHE_KEY);

        // If the value isn't yet cached, compute it and cache it for later.
        if (piValueCacheItem == null)
        {
            // The digits of Pi aren't yet computed, so do so now.
            piValue = PiCalculator.Process(DIGITS_OF_PI_TO_COMPUTE);

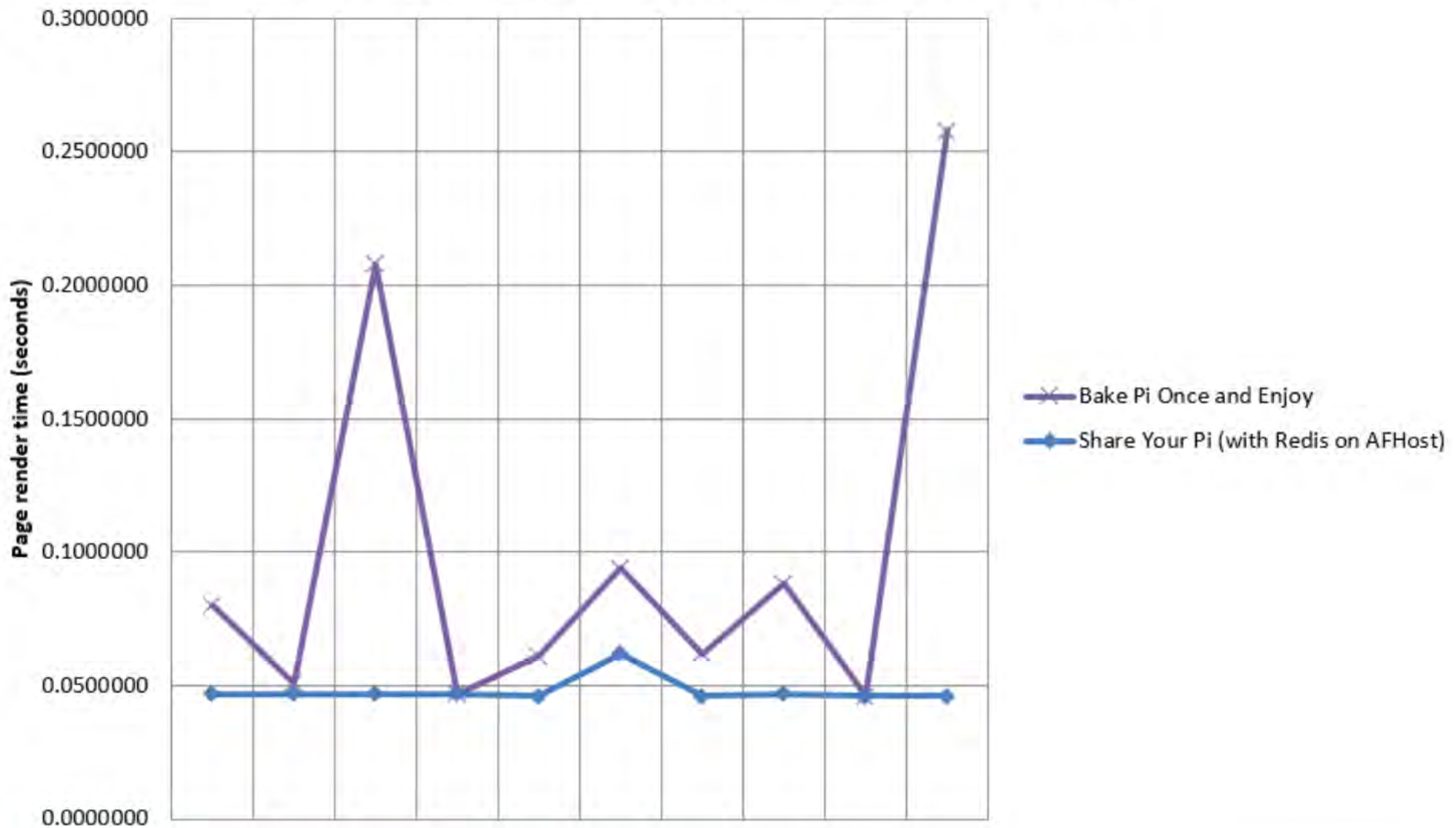
            // Insert the computed value of Pi into the Redis Cache
            redisCache.Set(PI_VALUE_CACHE_KEY, piValue);
        }
        else
        {
            // We got a non-null value back from the Redis cache, so simply convert
            // it to a String.
            piValue = piValueCacheItem.ToString();
        }
    }

    // That's it - return the String representing the computed value of Pi.
    return piValue;
}
```

# Demo



## ASP.NET Cache Use vs. Redis Distributed Cache



### Average Page Render Times

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

- ASP.NET Cache: 0.0995 sec
- Redis Distributed : 0.0481 sec

# Limitations and Watch-Outs

- Redis \*IS\* a durable store, so whatever you cached will persist beyond the life of the current application/process
- Requires third-party libraries and installations.

Sum-up: Easy to setup and use - basically what we wished we had with Windows AppFabric Caching.

Next-up:

Control-Level  
Caching





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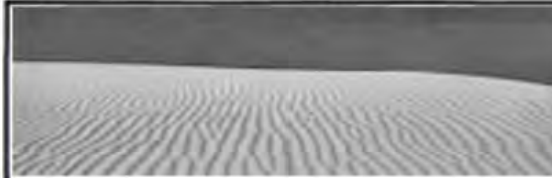
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Universe > Dune Life

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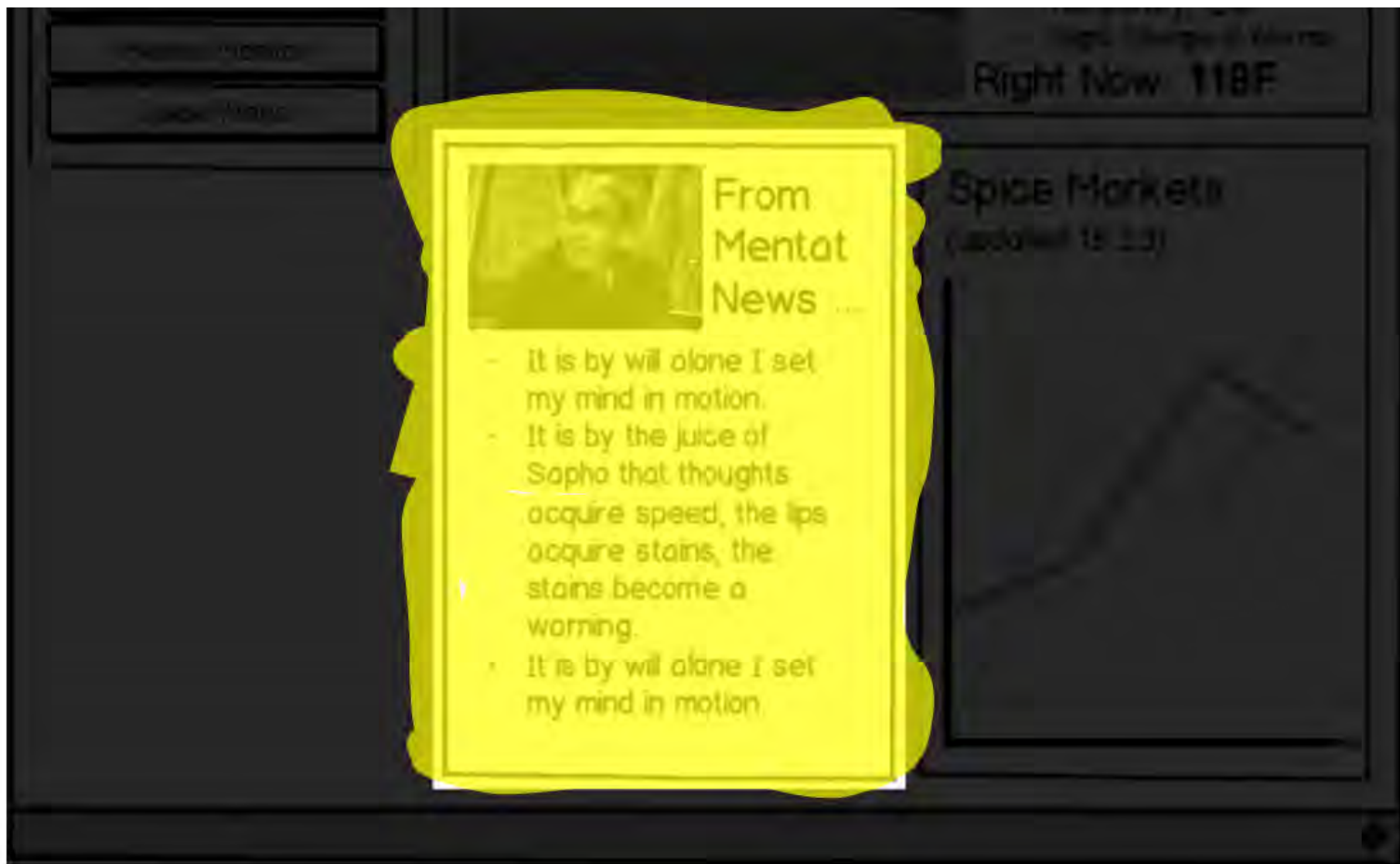
(updated 15:23)



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- Control displays static content or ...
- Entire HTML output block generated by control changes infrequently and/or 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="WeatherRightNowScrapper.ascx.cs" Inherits='

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

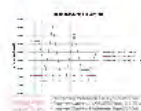
```

```

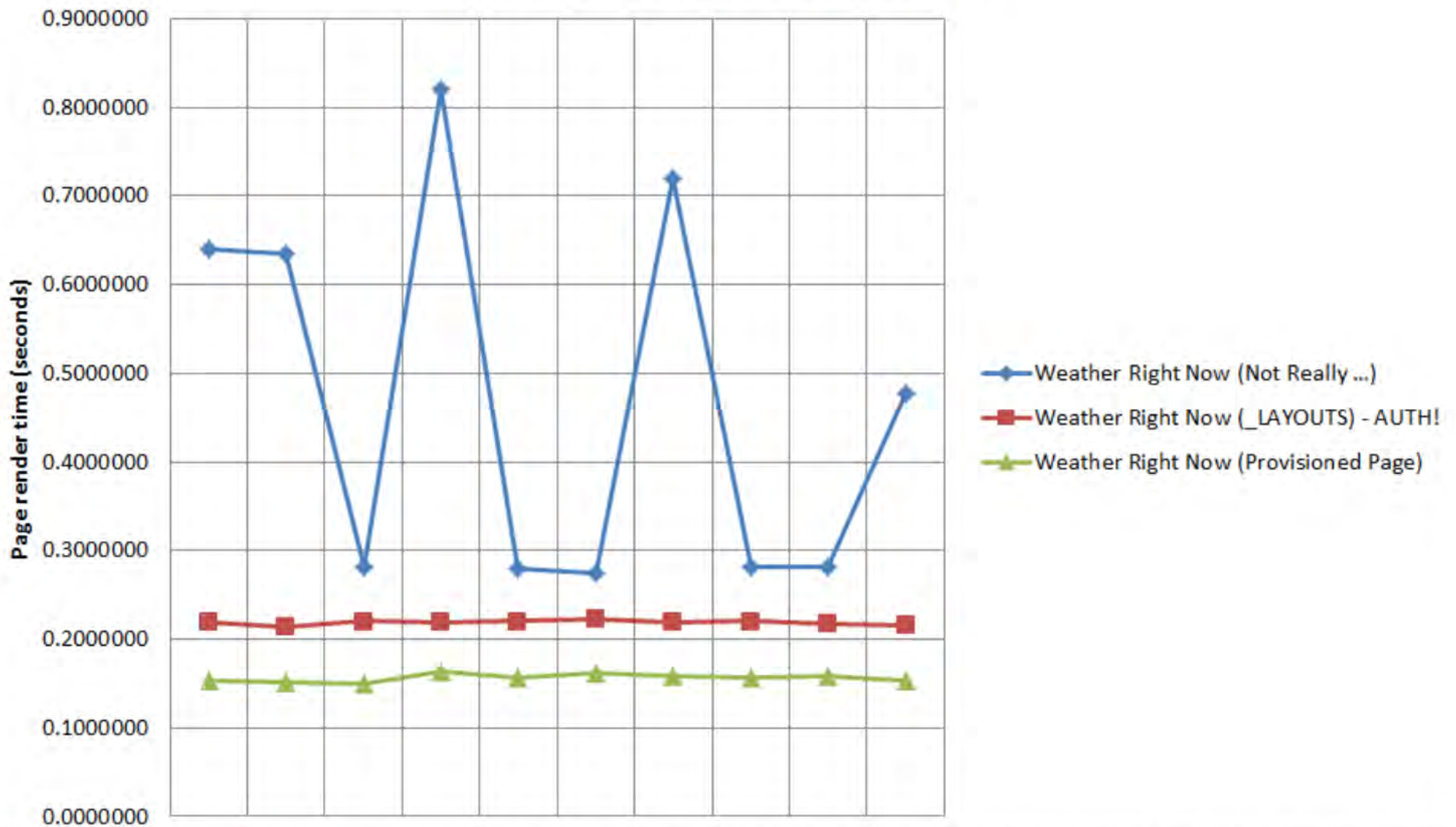
<asp:Panel ID="MainPanel" runat="server" BorderStyle="Solid" BorderWidth="1px" style="padding: 5px;">
    TIME WHEN CONTROL WAS RENDERED: <asp:Label ID="GenerationTimeLabel" runat="server"></asp:Label>
    <br />
    TIME TO GENERATE HTML OUPUT: <asp:Label ID="TimeToComputeLabel" runat="server"></asp:Label>
    <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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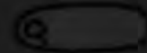
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### Spice Markets

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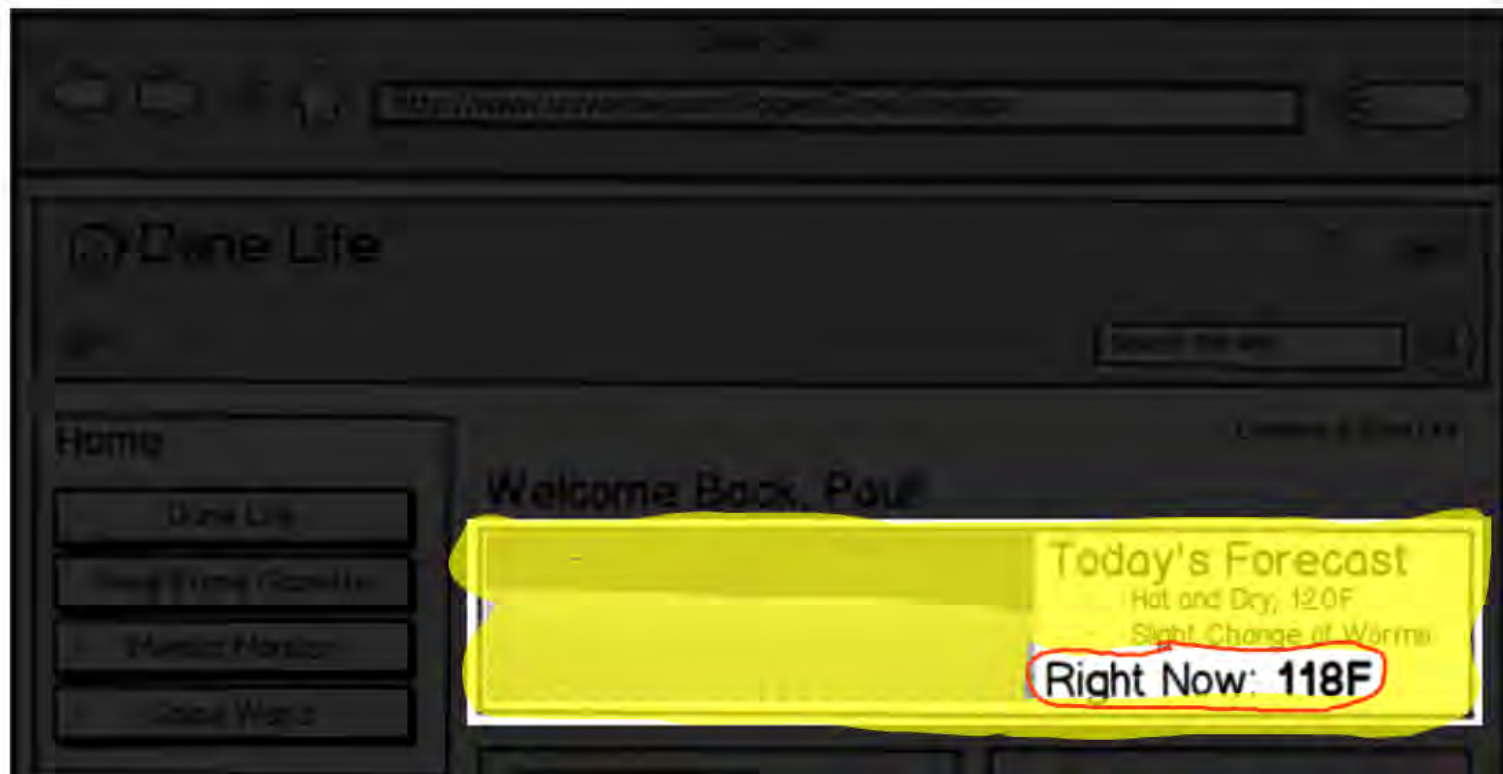
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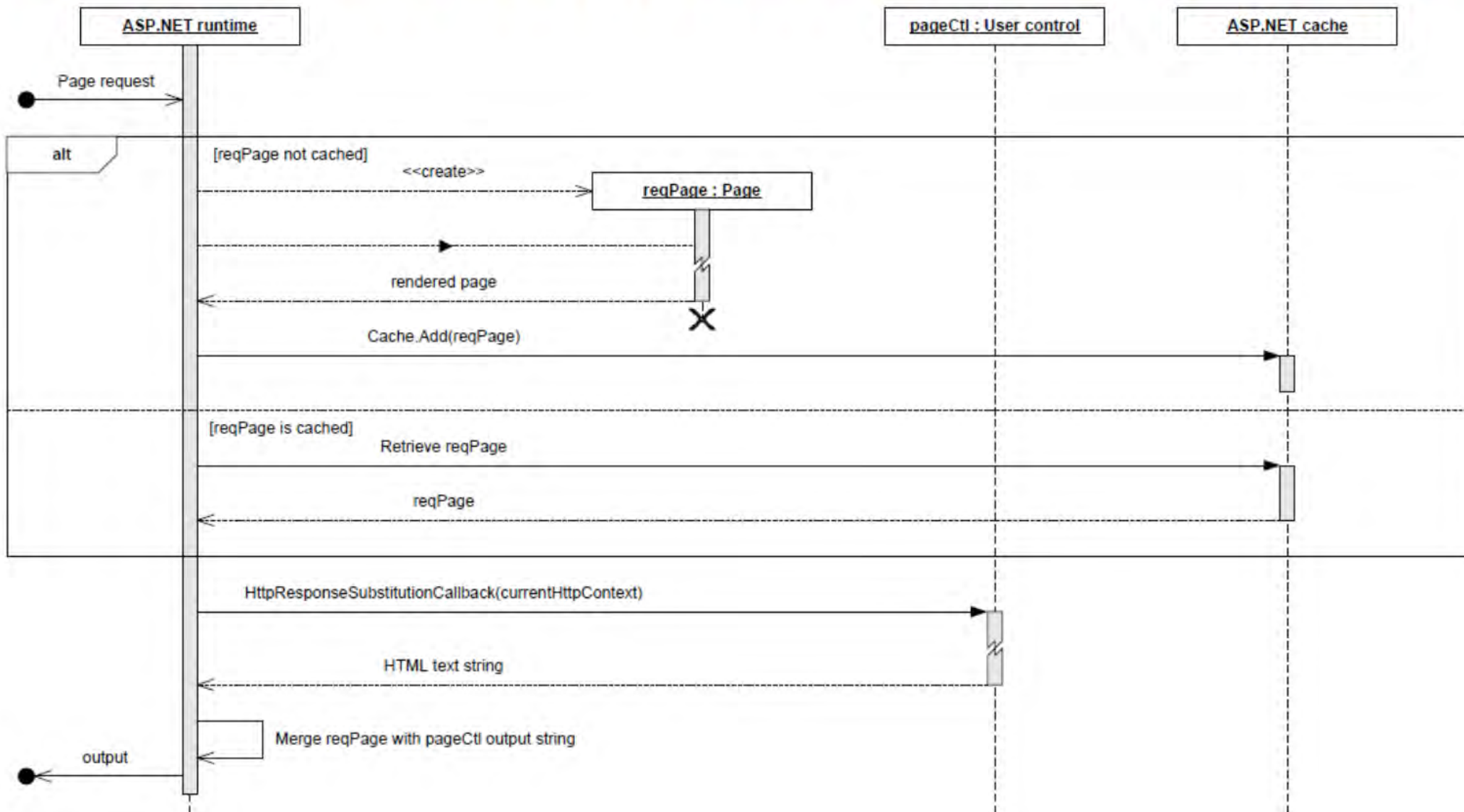


- You are leveraging page output caching (i.e., the entire page's HTML output gets cached)
- Your control contains a mix of static and dynamic content
- You need a way to update the dynamic part (e.g., the "Right Now" temperature)





# Post-Cache Substitution

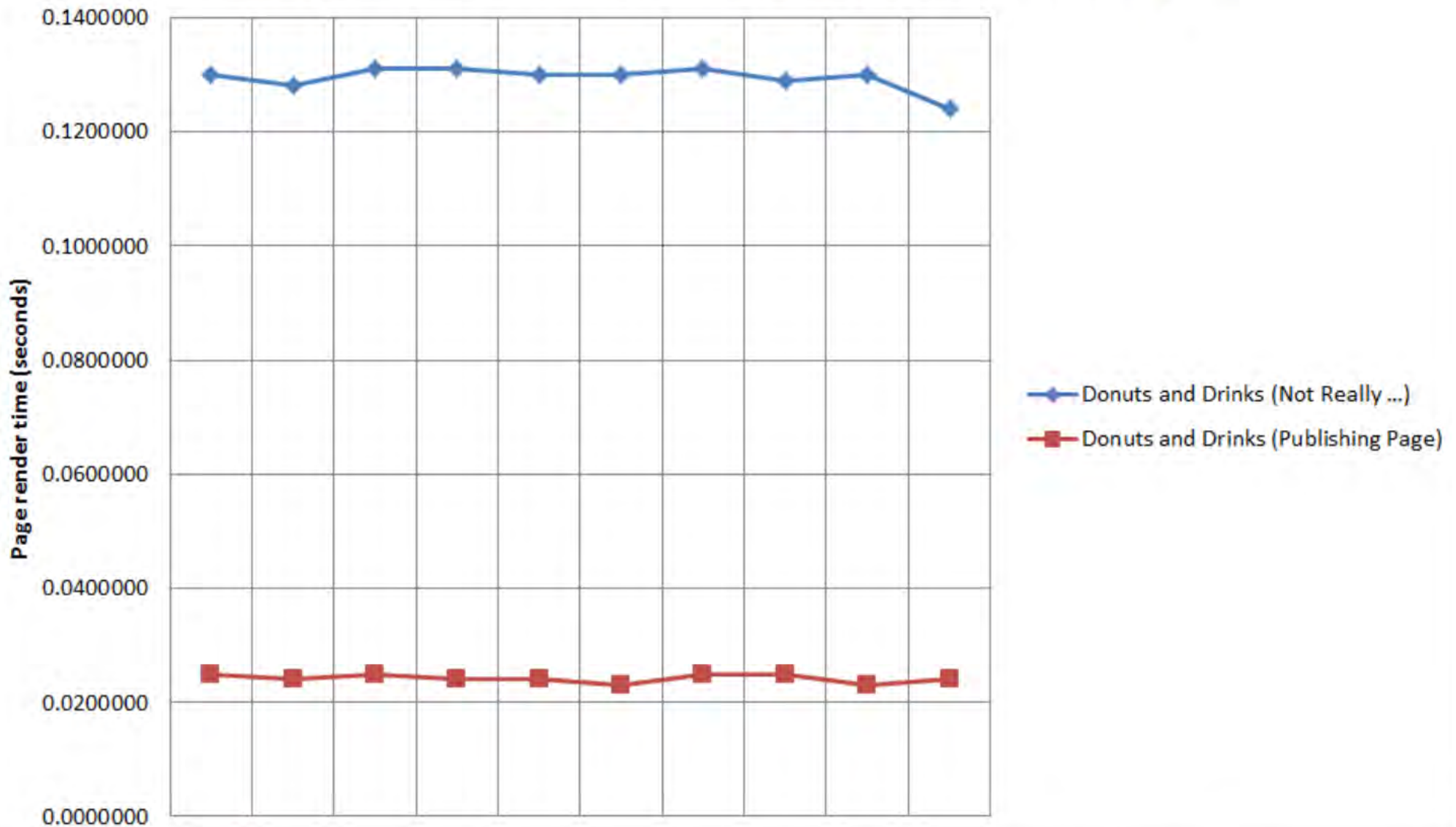


Page output caching "with benefits"

# 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 actually make this work
- 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



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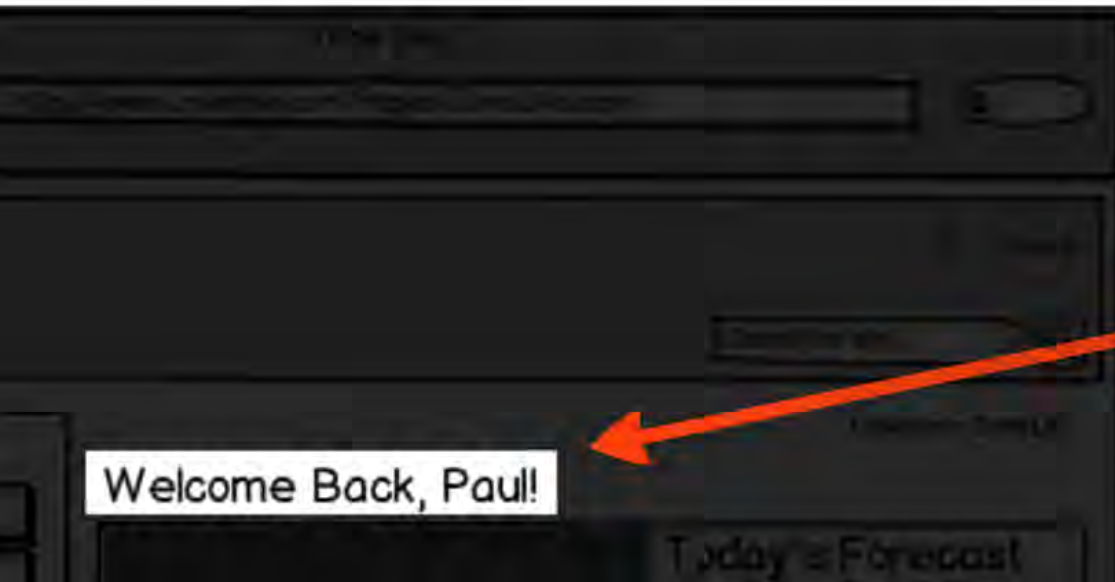
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Spice Markets (updated 15:23)



- You need a way to more granularly control SharePoint's page output caching, or ...
- You need a way to control or completely disable caching across site collections based on run-time conditions/circumstances, or ...
- You want to affect output caching changes through SharePoint plumbing (w/o controls)



Conditionally  
include or  
exclude full  
page from page  
output cache



# 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

# Implementation Process

- Create a class that derives from SPHttpApplication and implements both IHttpModule and IVaryByCustomHandler\*
- Register the derived class for notifications using RegisterGetVaryByCustomStringHandler
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PERFORMANCE 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

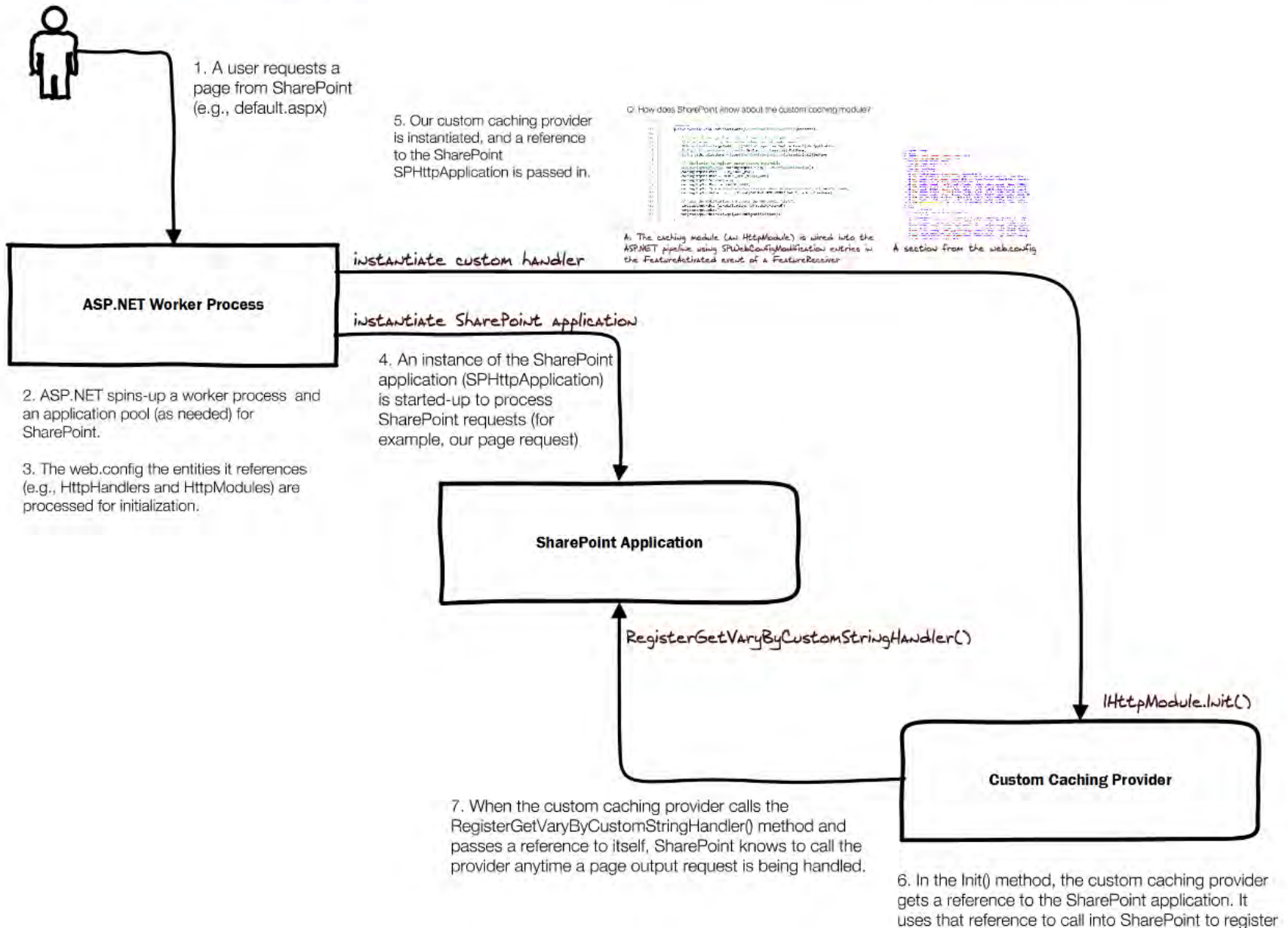
"Vary by Custom Parameter"  
in your output cache profile  
activates the handler!

# 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

# Application Setup

Assumption: application pool isn't spun-up yet.



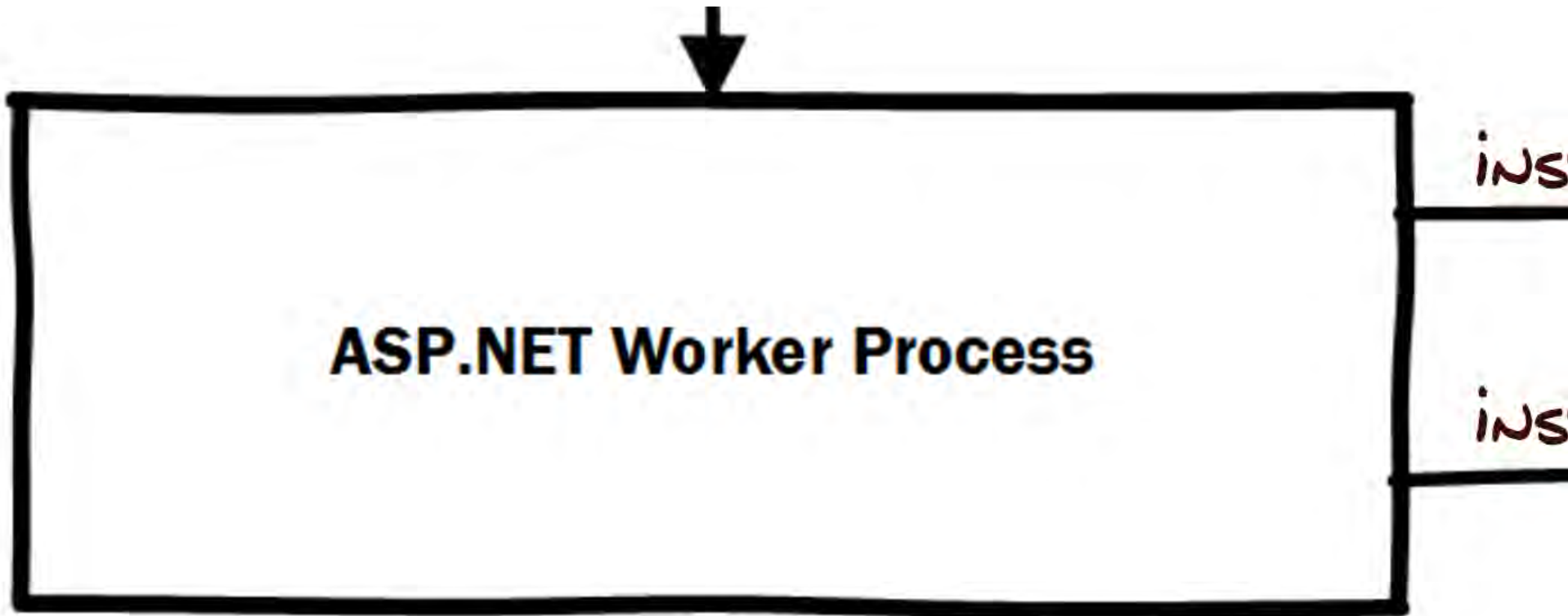
ASSUMPTION: Application pool isn't spun-up yet.



1. A user requests a page from SharePoint (e.g., default.aspx)







2. ASP.NET spins-up a worker process and an application pool (as needed) for SharePoint.

3. The web.config the entities it references (e.g., HttpHandlers and HttpModules) are processed for initialization.

## instantiate SharePoint application

```
graph TD; A[instantiate SharePoint application] --> B[4. An instance of the SharePoint application (SPHttpApplication) is started-up to process SharePoint requests (for example, our page request)]; B --> C[SharePoint Application];
```

4. An instance of the SharePoint application (SPHttpApplication) is started-up to process SharePoint requests (for example, our page request)

**SharePoint Application**

5. Our custom caching provider is instantiated, and a reference to the SharePoint SPHttpApplication is passed in.

instantiate custom handler

Q: How does SharePoint know about the custom caching module?

```
40 |
41 | public override void FeatureActivated(SPFeatureReceiverProperties properties)
42 | {
43 |     // We need to do registration here to ensure that HttpModules are wired
44 |     // into the web.config. Grab a few references and needed names.
45 |     SPWebApplication targetWebApp = ((SPSite)properties.Feature.Parent).WebApplication;
46 |     String fullAssemblyName = Assembly.GetExecutingAssembly().FullName;
47 |     String cachingClassName = typeof(HadACookieCustomModule).AssemblyQualifiedName;
48 |
49 |     // Modification to register custom caching HttpModule
50 |     SPWebConfigModification cachingHttpMod = new SPWebConfigModification();
51 |     cachingHttpMod.Path = HTTP_MODULE_PATH;
52 |     cachingHttpMod.Name = CACHING_HTTP_MODULE_NAME;
53 |     cachingHttpMod.Sequence = 0;
54 |     cachingHttpMod.Owner = FEATURE_OWNER;
55 |     cachingHttpMod.Type = SPWebConfigModification.SPWebConfigModificationType.EnsureChildNode;
56 |     cachingHttpMod.Value = String.Format(CACHING_HTTP_MODULE_VALUE, cachingClassName);
57 |
58 |     // Apply the modifications and update the web.config file(s).
59 |     targetWebApp.WebConfigModifications.Add(cachingHttpMod);
60 |     targetWebApp.Update();
61 |     targetWebApp.WebService.ApplyWebConfigModifications();
62 | }
63 |
```

A: The caching module (an HttpModule) is wired into the ASP.NET pipeline using SPWebConfigModification entries in the FeatureActivated event of a FeatureReceiver

```

</requestFiltering>
</security>
<validation validateIntegratedModeConfiguration="false" />
<modules runAllManagedModulesForAllRequests="true">
  <remove name="AnonymousIdentification" />
  <remove name="FileAuthorization" />
  <remove name="Profile" />
  <remove name="WebDAVModule" />
  <remove name="Session" />
  <add name="SPNativeRequestModule" preCondition="integratedMode" />
  <add name="SPRequestModule" preCondition="integratedMode" type="Microsoft.SharePoint.ApplicationRuntime.SPRe
  <add name="ScriptModule" preCondition="integratedMode" type="System.Web.Handlers.ScriptModule, System.Web.Ex
  <add name="SharePoint14Module" preCondition="integratedMode" />
  <add name="StateServiceModule" type="Microsoft.Office.Server.Administration.StateModule, Microsoft.Office.Se
  <add name="PublishingHttpModule" type="Microsoft.SharePoint.Publishing.PublishingHttpModule, Microsoft.Share
  <add name="DesignHttpModule" preCondition="integratedMode" type="Microsoft.SharePoint.Publishing.Design.Desi
  <add name="FederatedAuthentication" type="Microsoft.SharePoint.IdentityModel.SPFederationAuthenticationModul
  <add name="SessionAuthentication" type="Microsoft.SharePoint.IdentityModel.SPSessionAuthenticationModule, Mi
  <add name="SPWindowsClaimsAuthentication" type="Microsoft.SharePoint.IdentityModel.SPWindowsClaimsAuthentic
  <add name="SPApplicationAuthentication" type="Microsoft.SharePoint.IdentityModel.SPApplicationAuthentication
  <add name="HadACookieHttpModule" type="SPMcDonough.CachingCodeSolutions.CcsExamples.HadACookieCustomModule,
</modules>
<handlers>
  <remove name="OPTIONSVerbHandler" />
  <remove name="WebServiceHandlerFactory-Integrated" />
  <remove name="WebDAV" />
  <add name="OwssvrHandler" scriptProcessor="C:\Program Files\Common Files\Microsoft Shared\Web Server Extensi
  <add name="ScriptHandlerFactory" verb="*" path="*.asmx" preCondition="integratedMode" type="System.Web.Scrip
  <add name="ScriptHandlerFactoryAppServices" verb="*" path="*_AppService.axd" preCondition="integratedMode" t
  <add name="ScriptResource" preCondition="integratedMode" verb="GET,HEAD" path="ScriptResource.axd" type="Sys
  <add name="ChartImg" verb="*" path="ChartImg.axd" type="System.Web.UI.DataVisualization.Charting.ChartHttpHa
  <add name="JSONHandlerFactory" path="*.json" verb="*" type="System.Web.Script.Services.ScriptHandlerFactory,
  <add name="CrossDomainAjaxOptions" verb="OPTIONS" path="CrossDomainAjax.aspx" resourceType="Unspecified" pre
  <add name="ReportViewerWebControl" verb="*" path="Reserved.ReportViewerWebControl.axd" type="Microsoft.Repo
  <remove name="ExtensionlessUrl-ISAPI-4.0 64bit" />

```

A section from the web.config

```
add name="PublishingHttpModule" type="
add name="DesignHttpModule" preCondi
add name="FederatedAuthentication" typ
add name="SessionAuthentication" type=
add name="SPWindowsClaimsAuthenticatio
add name="SPApplicationAuthentication"
add name="HadACookieHttpModule" type="
modules>
handlers>
remove name="OPTIONSVerbHandler" />
remove name="WebServiceHandlerFactory-
remove name="WebDAV" />
add name="OwssvrHandler" scriptProcess
```

`IHttpModule.Init()`

**Custom Caching Provider**

6. In the `Init()` method, the custom caching provider gets a reference to the SharePoint application. It uses that reference to call into SharePoint to register itself up for subsequent caching-related calls.

**SharePoint Application**

*RegisterGetVaryByCustomStringHandler()*

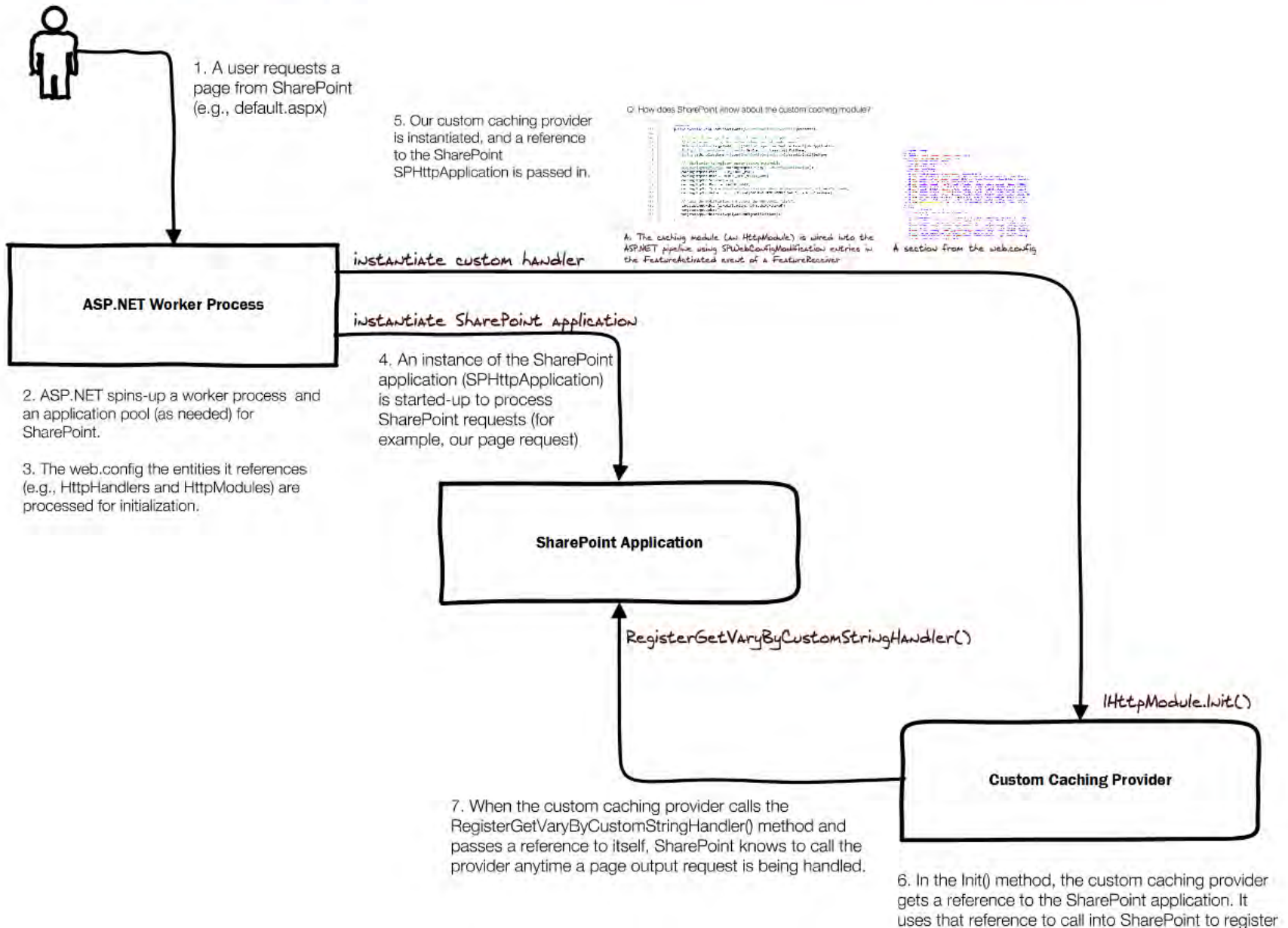
7. When the custom caching provider calls the RegisterGetVaryByCustomStringHandler() method and passes a reference to itself, SharePoint knows to call the provider anytime a page output request is being handled.

6. In the Init()

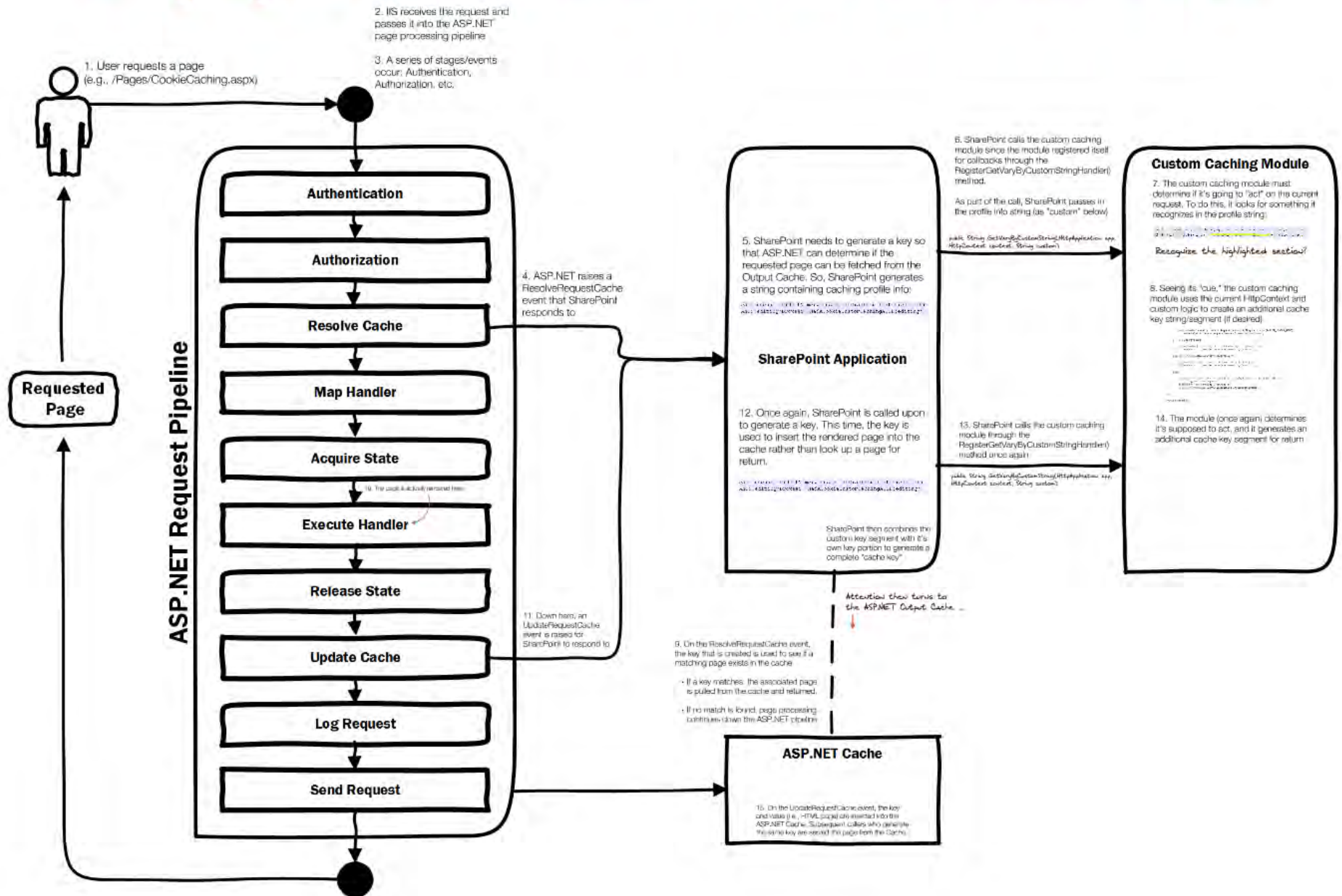


# Application Setup

Assumption: application pool isn't spun-up yet.



# Application Runtime



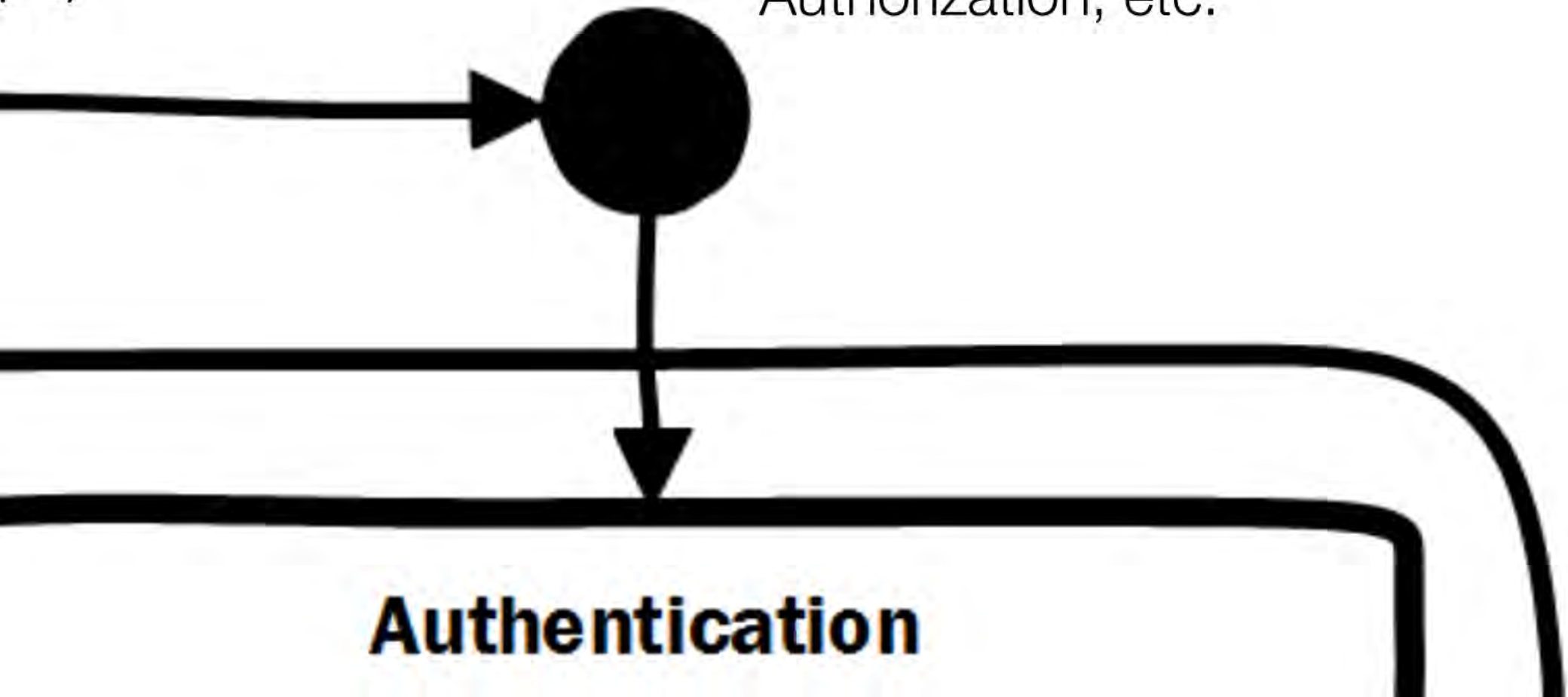
1. User requests a page  
(e.g., /Pages/CookieCaching.aspx)



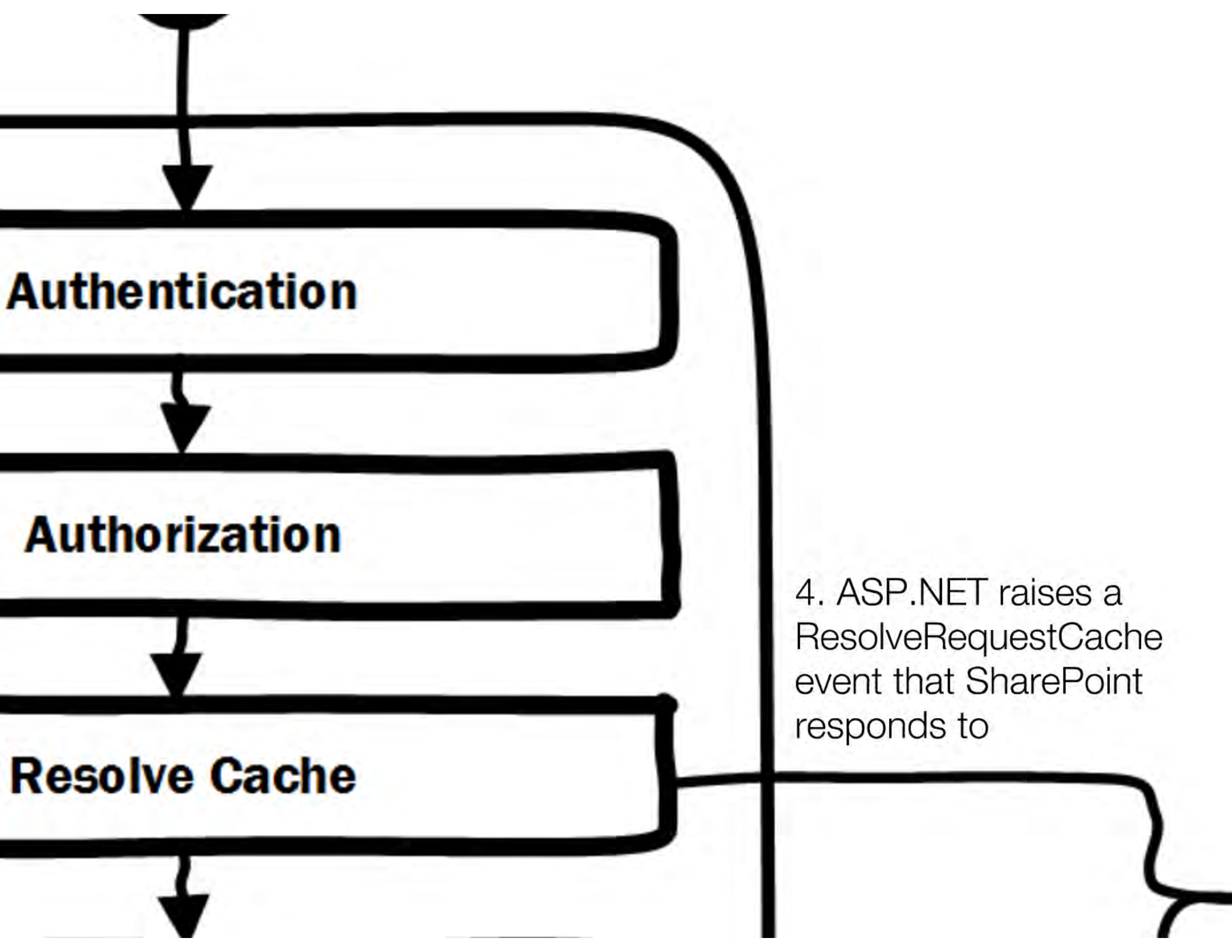
2. IIS receives the request and passes it into the ASP.NET page processing pipeline

3. A series of stages/events occur: Authentication, Authorization, etc.

px)



**Authentication**



5. SharePoint needs to generate a key so that ASP.NET can determine if the requested page can be fetched from the Output Cache. So, SharePoint generates a string containing caching profile info:


```
cachingenabled;HostName;wpcustomized;authenticated;console;  
ANON:editing;Browser, HadACookieCustomCachingAUTH:editing;
```

## **SharePoint Application**

6. SharePoint calls the custom caching module since the module registered itself for callbacks through the `RegisterGetVaryByCustomStringHandler()` method.

As part of the call, SharePoint passes in the profile info string (as "custom" below)

```
public String GetVaryByCustomString(HttpApplication app,  
HttpContext context, String custom)
```



# Custom Caching Module

7. The custom caching module must determine if it's going to "act" on the current request. To do this, it looks for something it recognizes in the profile string:

```
cachingenabled;HostName;wpcustomized;authenticated;console;  
ANON:editing;Browser, HadACookieCustomCachingAUTH:editing;
```

Recognize the highlighted section?



8. Seeing its "cue," the custom caching module uses the current HttpContext and custom logic to create an additional cache key string/segment (if desired)

```
Boolean isHeaderPresent = context.Request.Headers.AllKeys.Contains(TARGET_HEADER_NAME);
String headerValue = context.Request.Headers[TARGET_HEADER_NAME];

if (!isHeaderPresent)
{
    // No header is present; return a cache key for general use
    cacheKey = String.Format(CACHE_KEY_TEMPLATE, "ASBSENT");
}
else if (String.IsNullOrEmpty(headerValue))
{
    // Header is present but no per-user value is assigned.
    cacheKey = String.Format(CACHE_KEY_TEMPLATE, "PRESENT");
}
else
{
    // Header is present and a (potentially) unique value is assigned. Disable
    // caching for this request.
    cacheKey = Guid.NewGuid().ToString();
    PublishingHttpModule.DontEnableCachingForRequest(context);
}

return cacheKey;
```

```
e if (String.IsNullOrEmpty(headerValue))
```

```
// Header is present but no per-user value is assigned.  
cacheKey = String.Format(CACHE_KEY_TEMPLATE, "PRESENT");
```

```
e
```

```
// Header is present and a (potentially) unique value is assigned.  
// caching for this request.  
cacheKey = Guid.NewGuid().ToString();  
PublishingHttpModule.DontEnableCachingForRequest(context);
```

```
cacheKey;
```

SharePoint then combines the custom key segment with it's own key portion to generate a complete "cache key"

Attention then turns to the ASP.NET Output Cache ...



9. On the ResolveRequestCache event, the key that is created is used to see if a matching page exists in the cache.

- If a key matches, the associated page is pulled from the cache and returned.
- If no match is found, page processing continues down the ASP.NET pipeline

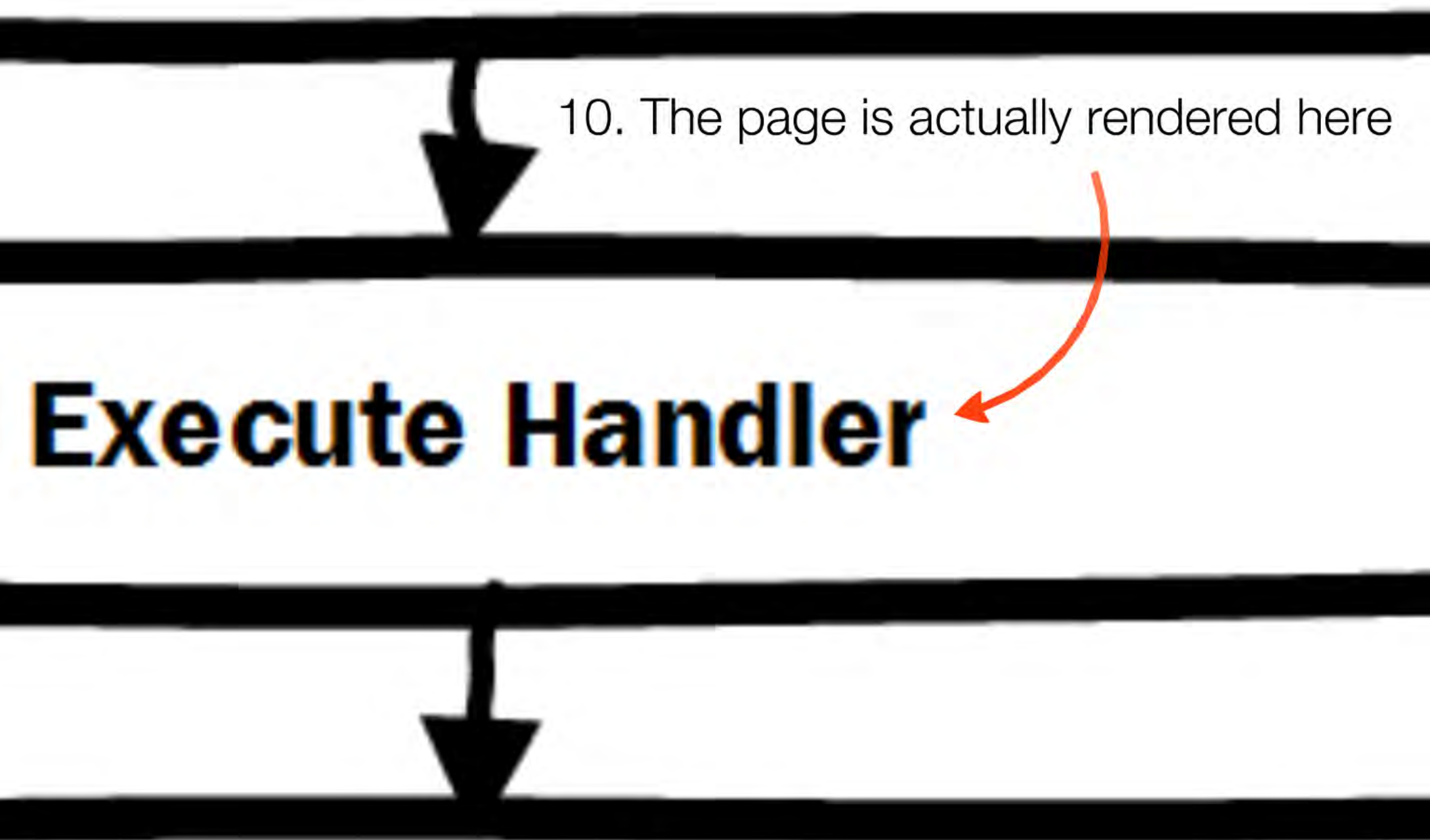


**ASP.NET Cache**

# Acquire State

10. The page is actually rendered here

# Execute Handler



**Acquire State**

10. The page is actually rendered here

**Execute Handler**

**Release State**

**Update Cache**


11. Down here, an UpdateRequestCache event is raised for SharePoint to respond to

# SharePoint Application

12. Once again, SharePoint is called upon to generate a key. This time, the key is used to insert the rendered page into the cache rather than look up a page for return.

```
cachingenabled;HostName;wpcustomized;authenticated;console;  
ANON:editing;Browser, HadACookieCustomCachingAUTH:editing;
```

13. SharePoint calls the custom caching module through the RegisterGetVaryByCustomStringHandler() method once again



```
public String GetVaryByCustomString(HttpApplication app,  
HttpContext context, String custom)
```



```
Boolean isHeaderPresent = context.Request.Headers.AllKeys.Contains(TARGET_HEADER_NAME);
String headerValue = context.Request.Headers[TARGET_HEADER_NAME];

if (!isHeaderPresent)
{
    // No header is present; return a cache key for general use
    cacheKey = String.Format(CACHE_KEY_TEMPLATE, "ABSENT");
}
else if (String.IsNullOrEmpty(headerValue))
{
    // Header is present but no per-user value is assigned.
    cacheKey = String.Format(CACHE_KEY_TEMPLATE, "PRESENT");
}
else
{
    // Header is present and a (potentially) unique value is assigned. Disable
    // caching for this request.
    cacheKey = Guid.NewGuid().ToString();
    PublishingHttpModule.DontEnableCachingForRequest(context);
}
}

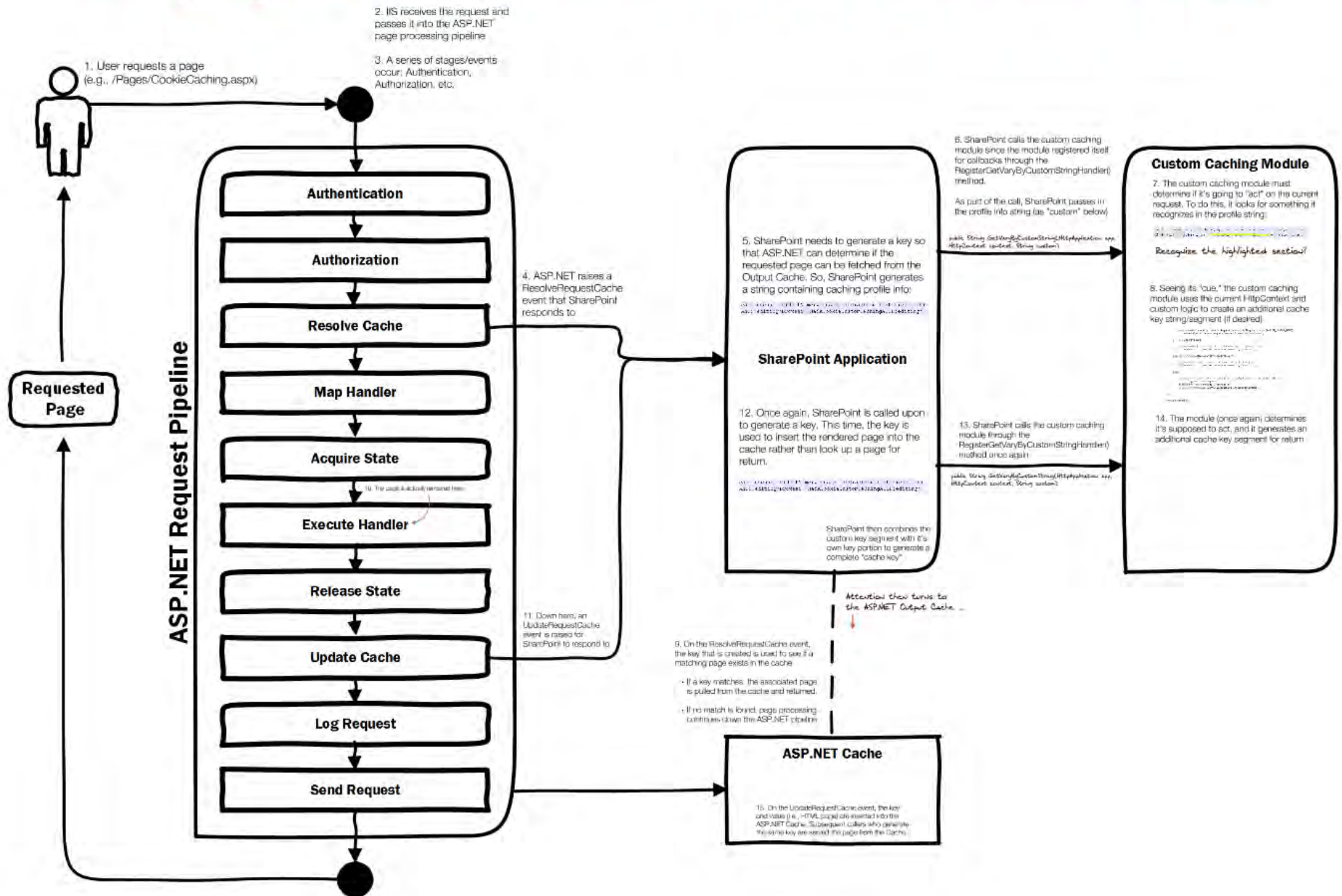
return cacheKey;
```

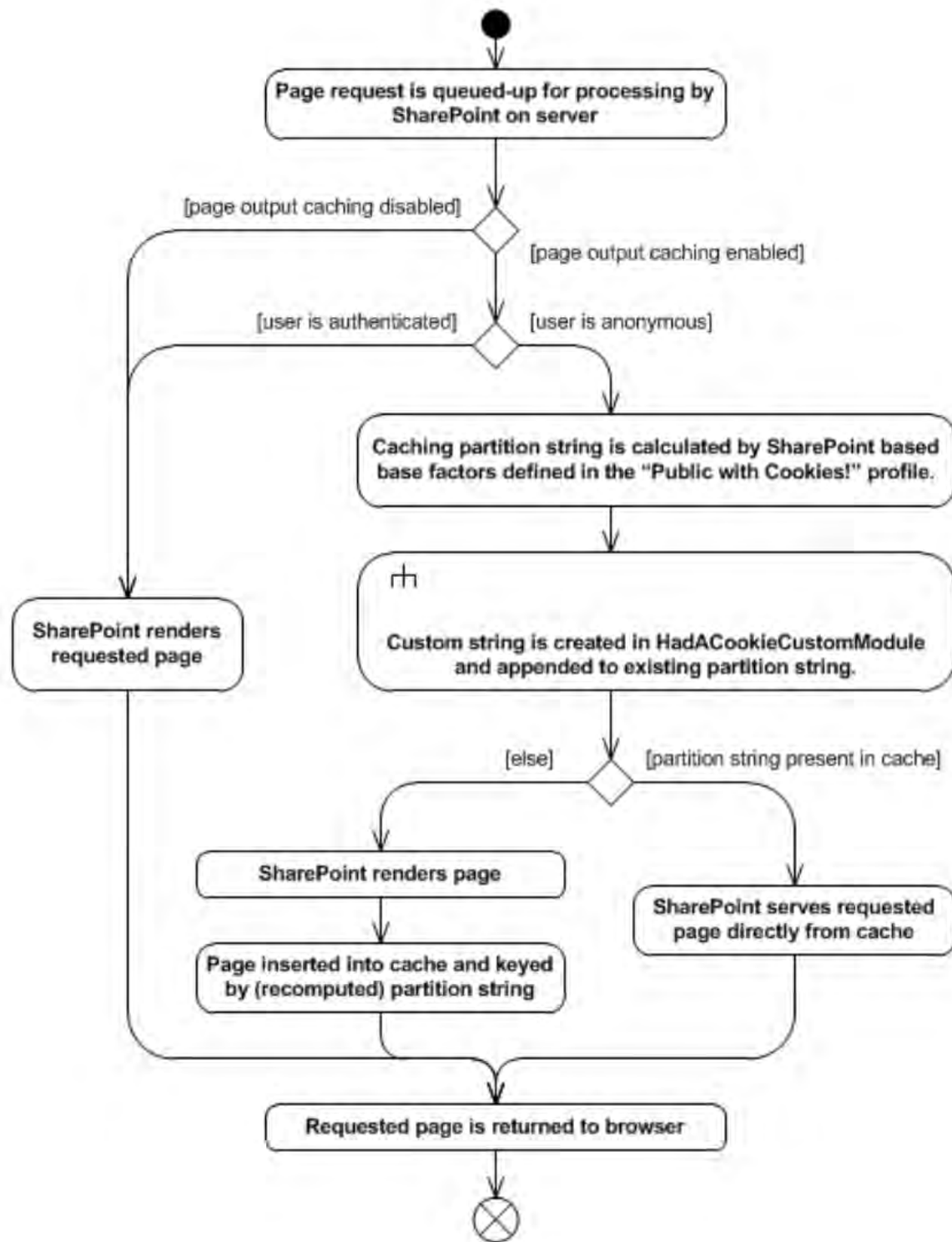
14. The module (once again) determines it's supposed to act, and it generates an additional cache key segment for return

# ASP.NET Cache

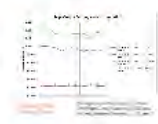
15. On the UpdateRequestCache event, the key and value (i.e., HTML page) are inserted into the ASP.NET Cache. Subsequent callers who generate the same key are served the page from the Cache.

# Application Runtime

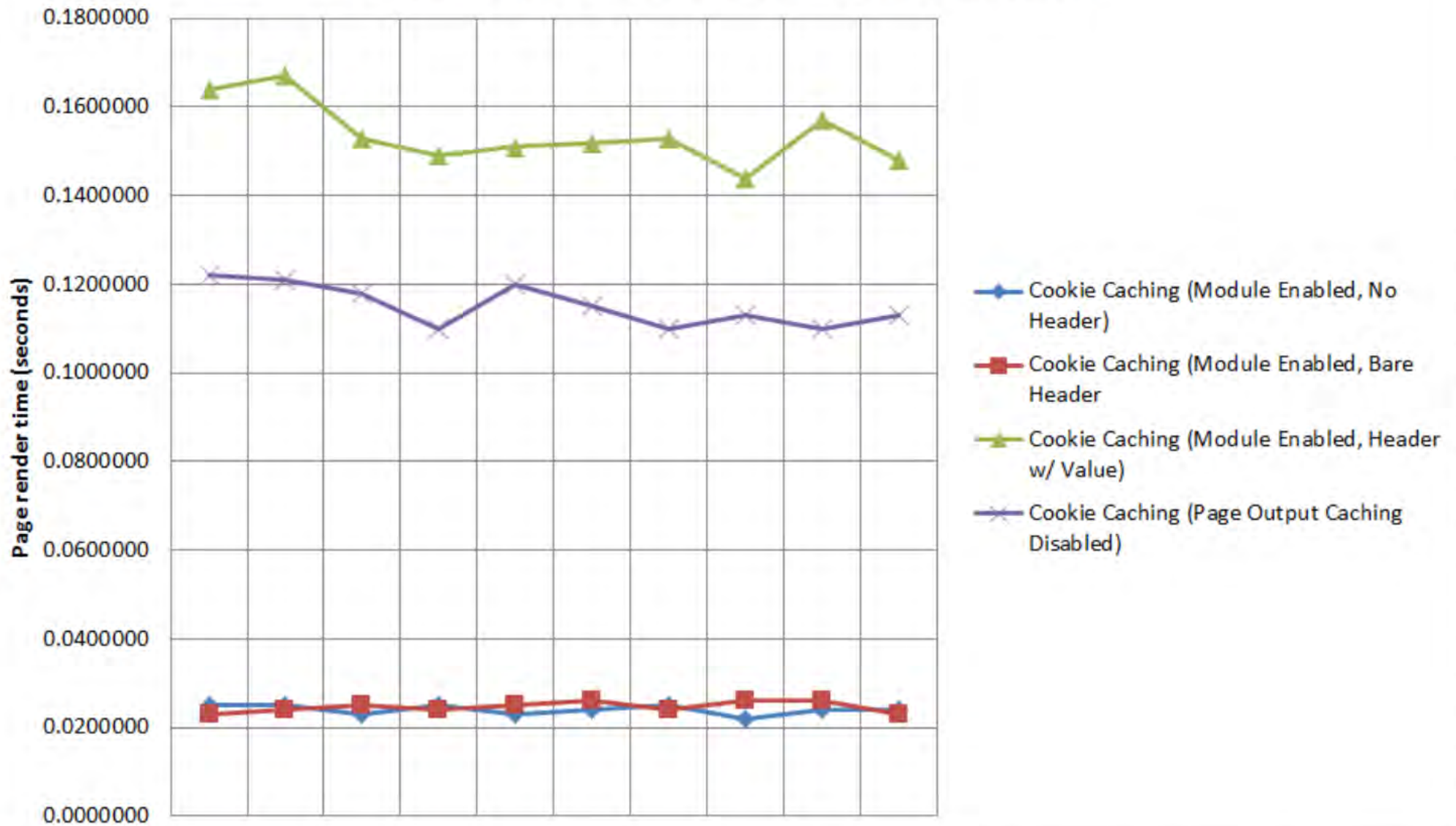




**Demo**



## 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*

\*  
1000

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

# 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*



# References

Cache Class (System.Web.Caching)

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

AppFabric 1.1 for Windows Server

<http://msdn.microsoft.com/en-us/windowsserver/ee695849>

Improve performance of your SharePoint 2010 applications using Windows Server AppFabric caching

<http://www.wictorwilen.se/Post/Improve-performance-of-your-SharePoint-2010-applications-using-Windows-Server-AppFabric-caching.aspx>

Plan for feeds and the Distributed Cache service in SharePoint Server 2013

<http://technet.microsoft.com/en-us/library/jj219572.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))

# References

## 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)

## 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/>

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Cumulative update package 6 for Microsoft AppFabric 1.1 for Windows Server

<http://support.microsoft.com/kb/3042099>

MANAGING Security (Windows Server AppFabric Caching)

[http://msdn.microsoft.com/en-us/library/ff921012\(v=azure.10\).aspx](http://msdn.microsoft.com/en-us/library/ff921012(v=azure.10).aspx)

Redis

<http://redis.io>



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# Questions?

*Please use Events XD (EventBoard)  
to fill out a session evaluation.*

# Thank you!



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