



# ASP.NET Caching Data

**ASP.NET MVC**  
Telerik School Academy  
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# Benefits and Costs of Caching

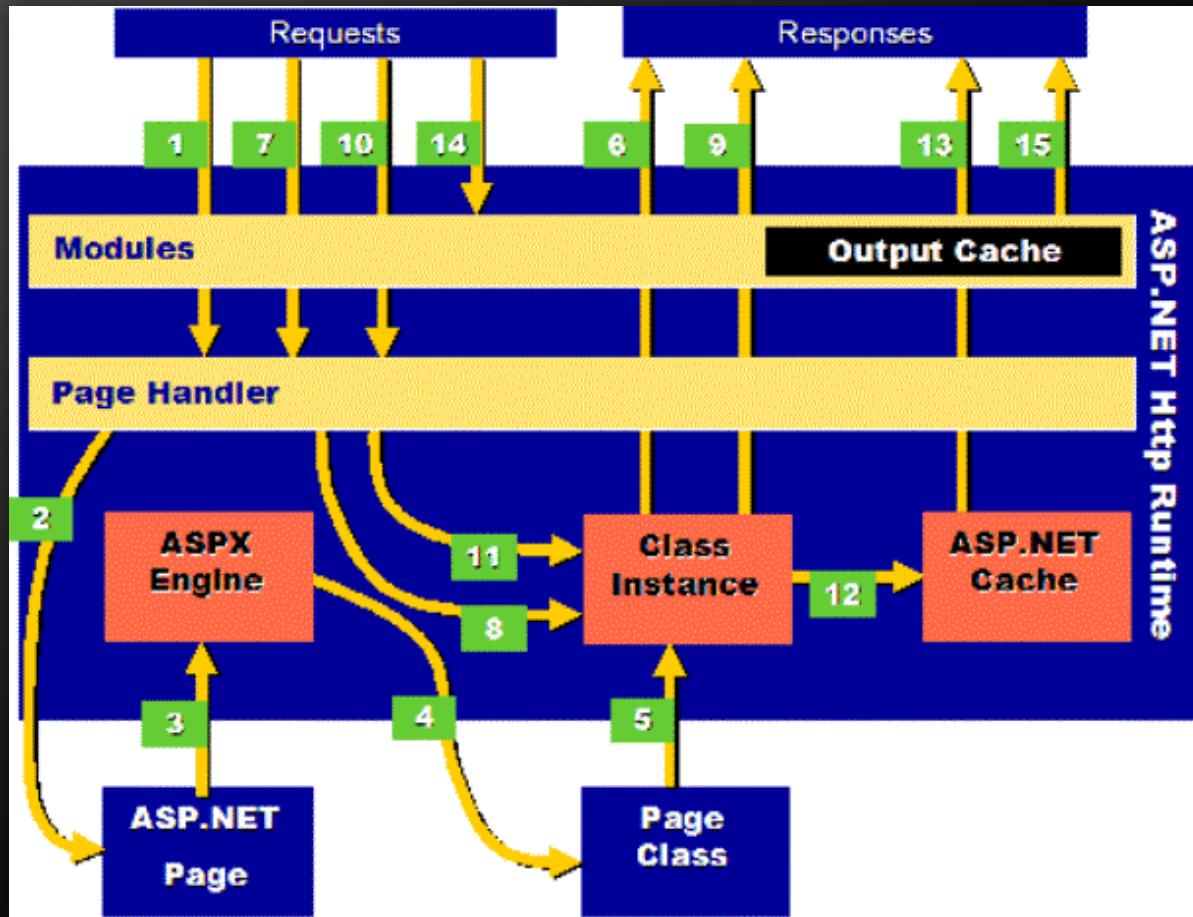
## ◆ Benefits of Caching

- ◆ Performance
  - ◆ Speed – Reduced response time
  - ◆ Efficiency – Reduced infrastructure usage
    - ◆ CPU time, database utilization, network bandwidth
  - ◆ Reduce DB round trips

## ◆ Costs of Caching

- ◆ Staleness (out-of-date)
- ◆ Need to check and refresh data

# ASP.NET Output Caching



# ASP.NET Output Caching

- ◆ For relatively static pages, rendered content can be cached
- ◆ OutputCache page directive in ASP.NET

```
<%@ OutputCache Duration="10" VaryByParam="none" %>
```

- ◆ OutputCache action filter in ASP.NET MVC and ASP.NET Web API

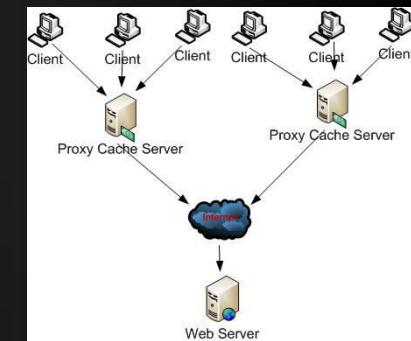
```
[OutputCache(Duration=10)]  
public ActionResult MyAction() { ... }
```

# OutputCache Attributes

Name	Values	Description
Duration	number	Time, in seconds, that the page or user control is cached
Location	'Any' 'Client' 'Downstream' 'Server' 'None'	<p>Controls the header and meta tags sent to clients indicating where this page can be cached.</p> <p>'Any' means that the page can be cached on the browser client, a downstream server, or the server.</p> <p>'Client' means that the page will be cached on the client browser only.</p> <p>'Downstream' means that the page will be cached on a downstream server and the client.</p> <p>'Server' means that the page will be cached on the server only.</p> <p>'None' disables output caching for this page.</p>
VaryByCustom	'Browser' custom string	Either vary the output cache by browser name and version, or by a custom string, which must be handled in an overridden version of GetVaryByCustomString().
VaryByHeader	'*' header names	A semi-colon separated list of strings representing headers submitted by a client.
VaryByParam	'none' '*' param name	A semi-colon separated list of strings representing query string values in a GET request, or variables in a POST request.

# Output caching location

- ◆ 3 types of caching with the 'location' attribute:
  - ◆ **server** – pages are cached in the worker process
  - ◆ **client** – pages are cached in client browsers that support it
  - ◆ **proxy** – pages are potentially cached by downstream proxies



Value	Cache-Control header	Expires header?	Cached on server?
'Any'	public	Yes	Yes
'Client'	private	Yes	No
'Downstream'	public	Yes	No
'Server'	no-cache	No	Yes
'None'	no-cache	No	No

# Caching multiple versions of a page

- ◆ **VaryByParam='none'** means a unique instance of a page is cached per verb
  - ◆ One for GET, one for POST
- ◆ If your page changes rendering based on query string or post body, you can use VaryByParam to cache additional versions
  - ◆ "\*" means cache a unique page for each different post body and/or query string (beware)
  - ◆ "varname" means cache a unique page for different values of this variable (semi-colon delimited list for multiple variables)

# VaryByParam values

- ◆ A semi-colon separated list of strings representing query string values in a GET request, or variables in a POST request.

Value	Description
'none'	One version of page cached per request type (GET, POST, HEAD)
'*'	N versions of page cached based on query string and/or POST body variables
'v1'	N versions of page cached based on value of v1 variable in query string or POST body
'v1;v2'	N versions of page cached based on value of v1 and v2 variables in query string or POST body

# VaryByHeader & VaryByCustom

- ◆ Other options for creating additional cached pages
  - ◆ **VaryByHeader** – any HTTP header
  - ◆ **VaryByCustom** – specify 'Browser' for unique cache entry for each browser type
  - ◆ **VaryByCustom** with `GetVaryByCustomString` method in `HttpApplication` derivative
    - ◆ Return your own string indicating whether it's a separate cache entry or not

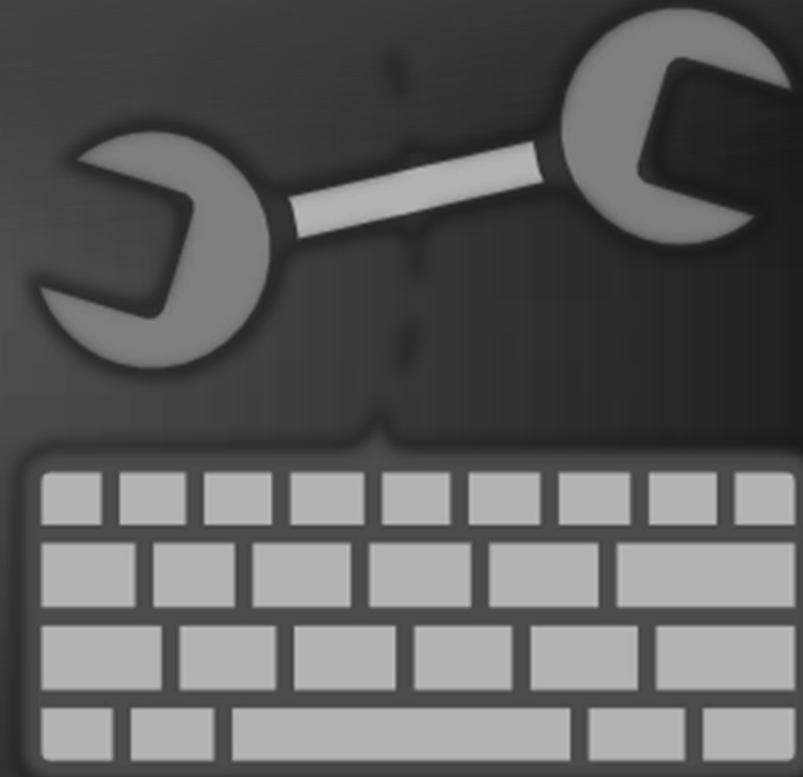


# OutputCache Demo

- ◆ Cache profiles

- ◆ Stored in web.config file
  - ◆ No need to recompile

```
<system.web>
  <caching>
    <outputCacheSettings>
      <outputCacheProfiles>
        <add name="ShortLived" duration="10"
              varyByParam="none" location="Server" />
        <add name="LongLived" duration="3600"
              varyByParam="none" location="Server" />
      </outputCacheProfiles>
      <!-- ... -->
    </outputCacheSettings>
  </caching>
</system.web>
```



# Cache Profiles Demo

# Page Fragment Caching MVC

- ◆ To cache a page fragment
  - ◆ 1. Encapsulate in child action with [OutputCache] and return partial view:

```
[OutputCache(Duration = 10, VaryByParam = "none")]
[ChildActionOnly]
public ActionResult ChildAction()
{
    return this.PartialView();
}
```

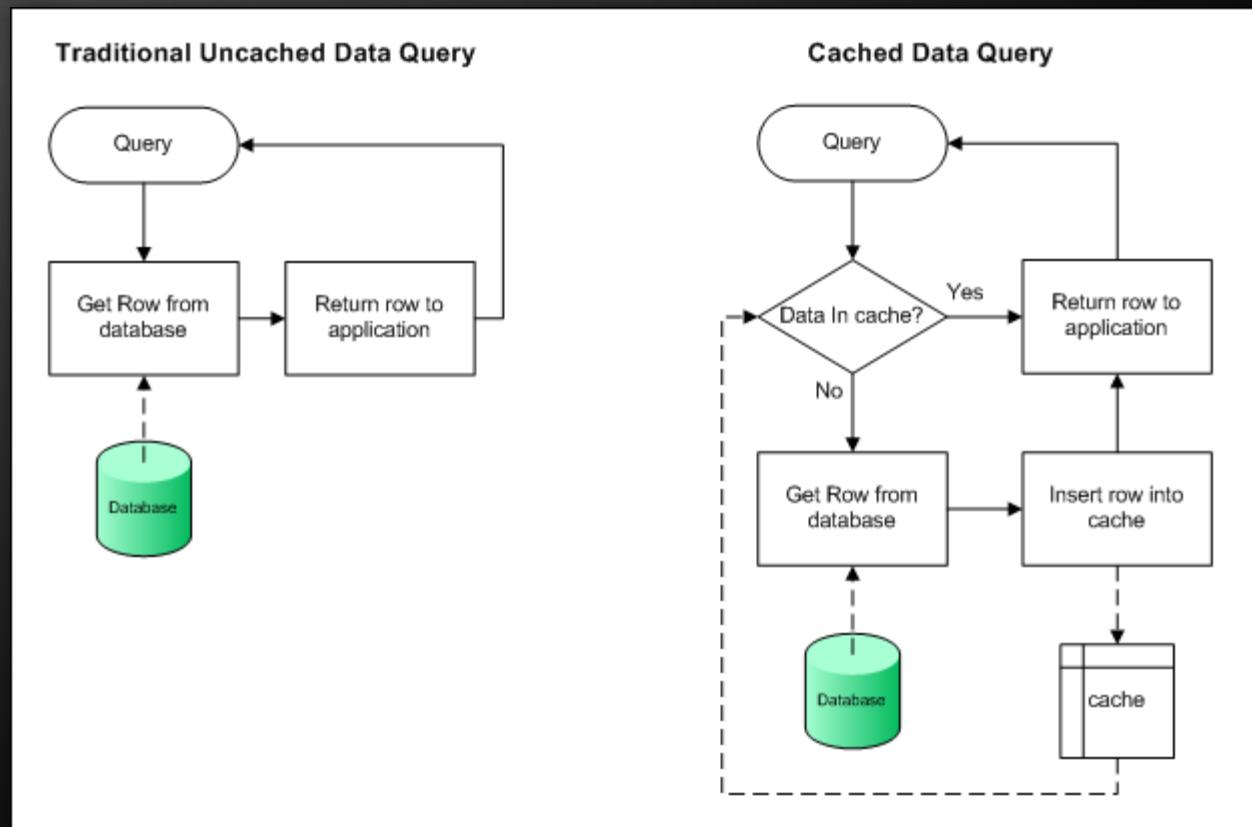
- ◆ 2. Call the child action from the view

```
@Html.Action("ChildAction")
```



# Page Fragment Caching Demo

# Data Caching



- ◆ Internally, OutputCaching is built using a sophisticated data cache
  - ◆ Available to you directly through Page.Cache for your own caching needs

```
if (this.Cache["time"] == null)
{
    this.Cache["time"] = DateTime.Now;
}

this.currentTimeSpan.InnerText =
((DateTime)this.Cache["time"]).ToString();
```

- ◆ this.Cache in ASP.NET WebForms
- ◆ this.HttpContext.Cache in ASP.NET MVC

# Cache Entry Attributes

- ◆ When adding cache entries, several attributes can be specified
  - ◆ Each insertion creates a new CacheEntry

Property	Type	Description
Key	string	Unique key used to identify this entry in the cache
Dependency	CacheDependency	A dependency this cache entry has -either on a file, a directory, or another cache entry -which when changed, should cause this entry to be flushed
Expires	DateTime	A fixed date and time after which this cache entry should be flushed
SlidingExpiration	TimeSpan	The time between which the object was last accessed and when the object should be flushed from the cache
Priority	CacheItemPriority	How important this item is to keep in the cache compared to other cache entries (used when deciding how to remove cache objects during scavenging)
OnRemoveCallback	CacheItemRemoved(Callback)	A delegate which can be registered with a cache entry for invocation upon removal

# Setting Cache Entry Params

- ◆ Example of setting cache entry parameters

```
if (this.Cache["time"] == null)
{
    // this.Cache["time"] = DateTime.Now;
    Cache.Insert(
        "time",                                // key
        DateTime.Now,                            // value
        null,                                   // dependencies
        DateTime.Now.AddSeconds(10),             // absolute exp.
        TimeSpan.Zero,                          // sliding exp.
        CacheItemPriority.Default,              // priority
        null);                                 // callback delegate
}

this.currentTimeSpan.InnerText =
    ((DateTime)this.Cache["time"]).ToString();
```

# Removing from the Cache

- ◆ Objects can be explicitly taken out of the cache
  - ◆ Explicitly by calling Remove
  - ◆ Cache can remove item implicitly for a variety of reasons (Data expiration, Memory consumption)
    - ◆ Low priority cache data will be removed first
  - ◆ Can register for removal notification, including reason





# Data Caching Demo

# ASP.NET Caching Data

Questions?

1. Create new project from the default ASP.NET MVC application template and:
  - ◆ Make About page cacheable for 1 hour
2. \* Add a new web page that shows the list of all files in a given directory and caches them till the directory changes
3. \* Learn more about caching by reading about
  - ◆ Data source caching
  - ◆ SQL cache dependencies
  - ◆ <http://www.codeproject.com/Articles/29899/Exploring-Caching-in-ASP-NET>

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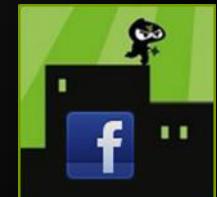
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