



You *can* make fast web pages



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You **can** build fast web pages

“Perceived” performance

- **Design and Content**
 - Typography, inter-relationships between whitespace and text, imagery
- **Raw speed**
 - Download speeds, rendering speed, avoiding “points of failure”

Web performance is like AstroJet Simulator



It's what the user *perceives* that's important

The image shows a screenshot of the Amazon.com homepage. At the top left is the Amazon logo with the 'Try Prime' tagline. To its right are navigation links: 'Don's Amazon.com', 'Today's Deals', 'Gift Cards', 'Sell', and 'Help'. On the far right of the top navigation is a 'Fall Outlet Event' banner with a leaf icon and a '> Shop now' link. Below the logo is a search bar with a 'Go' button. To the left of the search bar is a 'Shop by Department' dropdown menu that is open, listing various categories like 'Unlimited Instant Videos', 'Digital Music', 'Appstore for Android', 'Amazon Cloud Drive', 'Kindle E-readers & Books', 'Kindle Fire Tablets', 'Amazon Fire TV', 'Amazon Fire Phone', 'Books & Audible', 'Movies, Music & Games', 'Electronics & Computers', 'Home, Garden & Tools', 'Beauty, Health & Grocery', 'Toys, Kids & Baby', 'Clothing, Shoes & Jewelry', 'Sports & Outdoors', 'Automotive & Industrial', and 'Full Store Directory'. To the right of the search bar are user account links: 'Hello, Don', 'Your Account', 'Try Prime', a shopping cart icon with '1' in it, 'Cart', and 'Wish List'. The main content area features a banner for 'International Shipping Made Easy' with a sub-headline 'Over 10 Million Products Shipping to Over 65 Countries around the Globe' and a '> Learn more' link. Below this is a comparison section for 'Amazon Fire TV' and 'Roku 3' with a 'VS' icon. Further down is a banner for 'Get Your Orders Fast' stating 'Amazon Prime members enjoy unlimited FREE Two-Day Shipping on millions of'. On the right side, there are two promotional banners: one for 'fire PHONE + 12 MONTHS OF PRIME' for '\$0.99 with a two-year contract' and another for 'ZTE nubia 5S mini LTE' with a 'SHOP NOW' button. At the bottom right, there is a partial banner for 'Off to College'.



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Nielsen's Response-Time limits

- **0.1 seconds**
gives the feeling of instantaneous response
- **1 second**
keeps the user's flow of thought seamless
- **10 seconds**
keeps the user's attention, but only just

The screenshot shows the DevExpress website homepage. At the top left is the DevExpress logo with the tagline "Our tools Your apps when only the best will do". To the right are links for "Home" and "Contact", and a search bar. Below this is a dark navigation bar with links for "Products", "Free Trials & Demos", "Buy", and "Support". The main content area features a large banner with a map of the United States, orange pushpins, and a callout box for Albuquerque stating "TOTAL OPPORTUNITIES \$1,663,675.00". The banner text reads "SEE WHAT'S NEW IN 2014". To the right of the banner is a text box titled "Create multi platform hybrid applications with ease!" which mentions "DevExpress Universal v14.1, winner of the 2014 JOLT Award". Below the banner are four columns of text: "The Future, Here Today Touch-enabled controls", "Your Peers Voted And selected our products #1 in 20", "Create Amazing User Experiences", and "News and Events Best Practices: The SalesViewer".

DevExpress™

Home | Contact

Search...

Products Free Trials & Demos Buy Support

dashboard

TOTAL OPPORTUNITIES
\$1,663,675.00
Albuquerque

SEE WHAT'S NEW IN 2014

32°N 23.7°W

001,050.00

Mar/2012

Create multi platform hybrid applications with ease!

DevExpress Universal v14.1, winner of the 2014 JOLT Award is now shipping. Experience the DevExpress difference today and let's build great apps together.

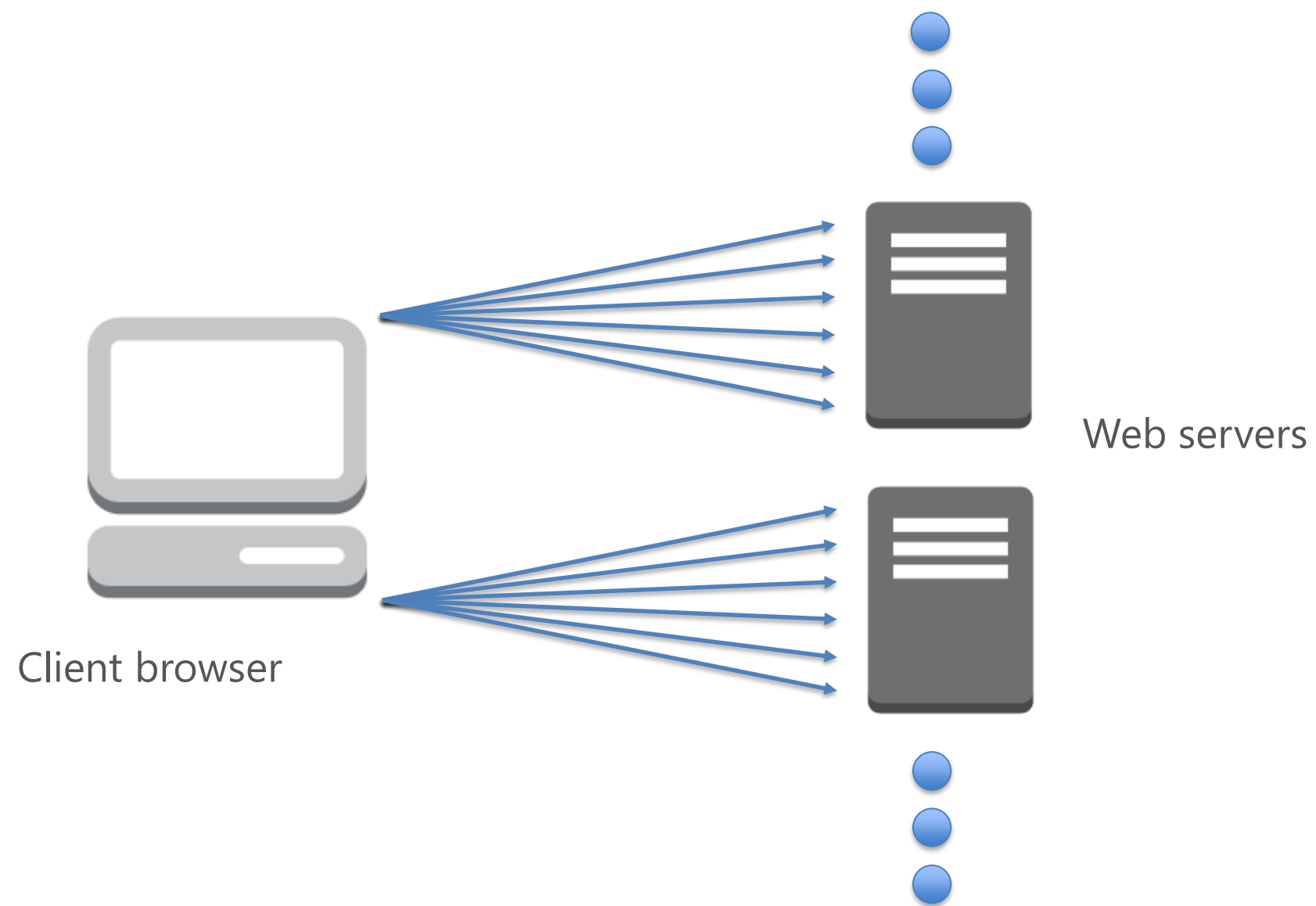
The Future, Here Today
Touch-enabled controls

Your Peers Voted
And selected our products #1 in 20

Create Amazing User Experiences

News and Events
Best Practices: The SalesViewer

Domain sharding





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Sharding recommendation

Three hostnames max

- Main host for markup
- CDN for JavaScript files
- Cloud host for images



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Reduce the number of files

Concatenate JavaScript and CSS files

- Caching issue
- Sharing issue
- Expiry Issue
- Strict Mode



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JavaScript Strict Mode

- **Insert "use strict" into code**
 - Catches common errors
 - Throws exceptions for unsafe code
 - Disable dodgy features
- **Apply to whole file or individual functions**

```
"use strict";

/*
 * My JavaScript code
 */
function someFunction() {
    "use strict";
    var result = "";
    /*
     * rest of code
     */
}
```



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Concatenating

- Test...
- Test...
- Test...



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Minification

- Removes unneeded whitespace
- Renames internal identifiers to shorter name



You can build fast web pages

Minification

```
/*
 * My JavaScript code
 */
(function () {
    "use strict";
    window.myFunc = function (arr, separator, skipEmpty) {
        var result = '';
        if (arr && !skipEmpty) {
            result = arr.join(separator);
        }
        else {
            arr.forEach(function (value/*, index*/) {
                var v = (value || '');
                if (v.toString() !== '') {
                    result += (result !== '' ? separator : '') + v.toString();
                }
            });
        }
        return result;
    };
})();
```



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Minification

```
(function(){"use strict";window.myFunc=function(n,t,i){var r="";return n&&!i?r=n.join(t):n.forEach(function(n){var i=n||"";i.toString()!=""&&(r+=(r!=""?t:"")+i.toString())}),r}})();
```



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Minifier tools

- JSMin (granddaddy of minifiers)
- Yahoo YUI Compressor
- AjaxMin does JavaScript and CSS
- Grunt / Gulp Uglify tasks for JavaScript and CSS

Image optimization

- Add image width and height attributes to `` tags

```

```

- Reduce image quality for JPGs
Makes them fuzzier
- Recompress PNGs
No quality loss, can take some time
- Concatenating images

PNG recompression with PNGOUT

Job	Status	File Name	Size	PNGOUT Size	Change in Bytes	% ...
1	Written	10-10-2008 2-13-53 PM.png	23261	20515	-2746	88%
2	Written	12-12-2011 10-03-36 AM.png	62132	50883	-11249	81%
3	Written	3.png	369141	334694	-34447	90%
4	Pass 6, 32%	5-5-2009 1-45-06 PM.png	137306			
5	Written	aaa.png	21299	14036	-7263	65%
6	Pass 3, 97%	About.png	628294			
7	No change	AboutBoxAt120dpi.PNG	35320			
8	Pass 1, 11%	AboutUs.png	448300			
9	Pass 0, 37%	ACME Trading Co - (Dark Room) - v9.p...	111214			
10		ACME Trading Co - (Metro) - v8.png	101917			
11		ACME Trading Co - (Office Blue) - v10....	107805			
12		ACME Trading Co - (Office Blue) - v6.p...	84922			

Paused Total Bytes Saved: 55705

Concatenating images ?



sprites.gif

```
#home {
  left: 0px;
  width: 46px;
  background: url('sprites.gif') 0 0;
}
#home a:hover {
  background: url('sprites.gif') 0 -45px;
}
#prev {
  left: 63px;
  width: 43px;
  background: url('sprites.gif') -47px 0;
}
#prev a:hover {
  background: url('sprites.gif') -47px -45px;
}
#next {
  left: 129px;
  width: 43px;
  background: url('sprites.gif') -91px 0;
}
#next a:hover {
  background: url('sprites.gif') -91px -45px;
}
```

```
<ul id="navlist">
  <li id="home"><a href="home.html"></a></li>
  <li id="prev"><a href="next.html"></a></li>
  <li id="next"><a href="prev.html"></a></li>
</ul>
```



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Places scripts at the end

- Do not place `<script>` tags in the `<head>`
- Place them at the end of the `<body>`



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Places scripts at the end

```
<!DOCTYPE html>

<html lang="en" xmlns="http://www.w3.org/1999/xhtml">
<head>
  <meta charset="utf-8" />
  <title></title>
  <link type="text/css" rel="stylesheet" href="css/mystyles.css" />
</head>
<body>
  <!-- your markup here -->
  <div class="container">
    <!-- ... -->
  </div>
  <script type="text/javascript" src="js/my-script.js"></script>
  <script type="text/javascript">
    doSomeCode();
    /* your javascript references and code
  </script>
</body>
</html>
```

Consider async and defer

- **async**
 - Load JavaScript asynchronously
 - Also means (possible) out-of-order execution
 - Good excuse for concatenation

```
<script async src="js/my-script.js"/>
```

- **defer**
Load JavaScript after document has been processed

```
<script defer src="js/my-last-code.js" />
```



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Consider a script loading library for async and defer

- [WebPack](#)
- [HeadJS.com](#)
- [Requirejs.org](#)

These tools take care of proper async and deferred script loading



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Performance is subjective

- Improve **technical** speed
But only attacking a small part of the problem
- Improve **perceived** performance
Pay attention to the render time



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Rule of thumb

- Assume 20% of time is spent downloading resources
- Rest of time (80%) is spent on rendering



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Quick Recap

Try setting up a deployment script, and use browser dev tools

- Optimize caching
- Minimize round-trips
- Minimize download payloads
- Optimize rendering
- Test
- Test
- Test



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Conclusion

Web performance is like AstroJet simulator

The important thing is how the user perceives the performance

Thank You!

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