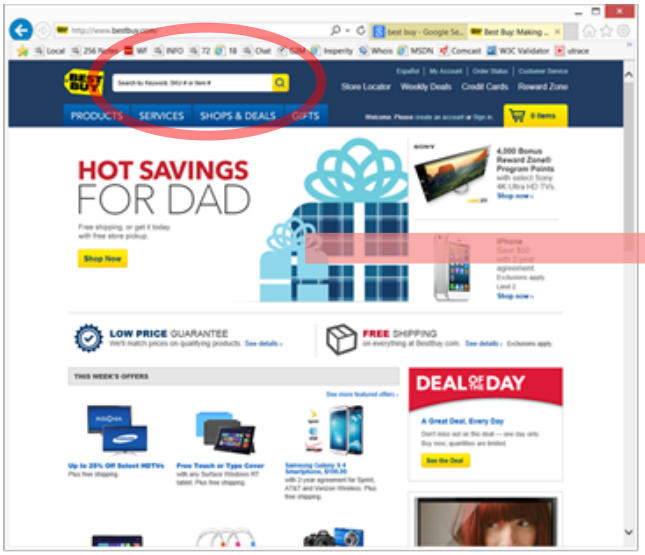
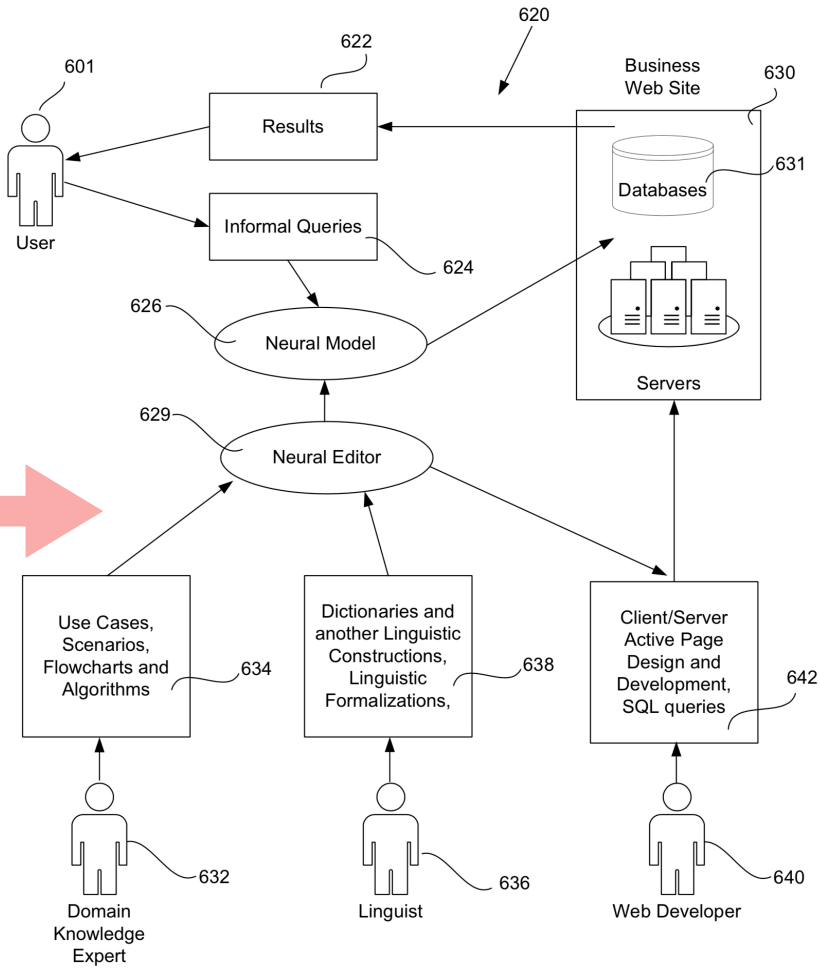
ChatBot in 7 Days

How to use Neural Networks to create Chatbot in a week

Development Diary: February 22, 2018 - February 28, 2018

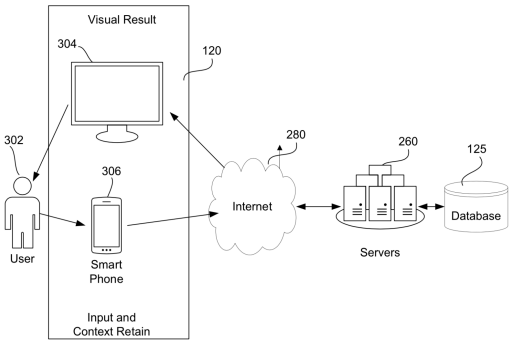
Best Buy

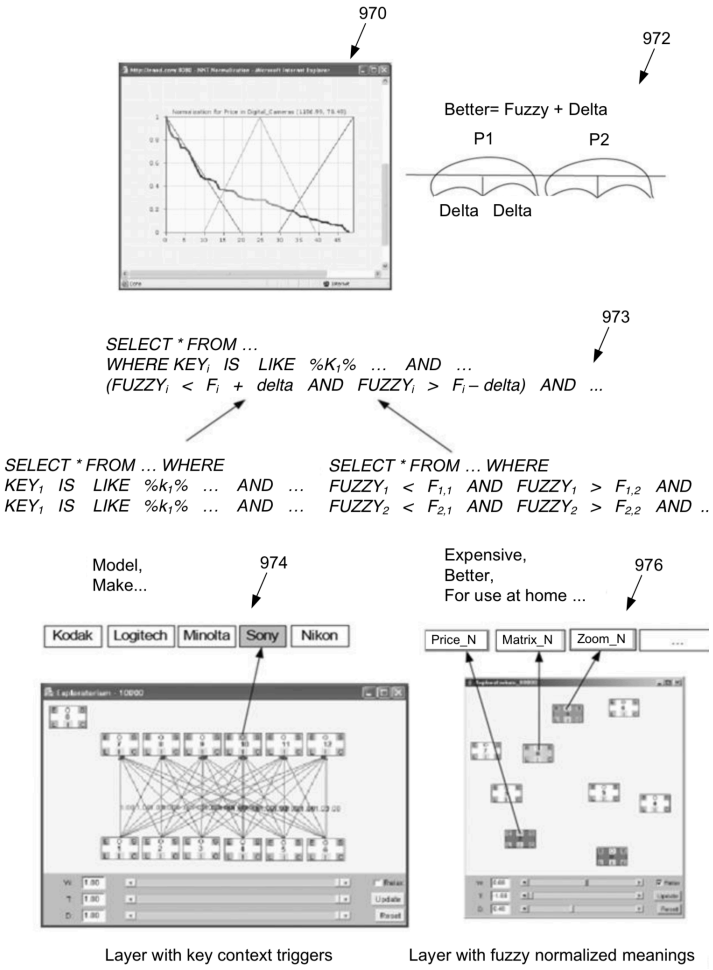




Introduction

We will build a ChatBot from scratch, using patented SDK and in very generic development environment. The goal is to show how easy is the process of building interactive contextual search with Neural Networks toolkit. As an example we will use BestBuy website and its Development API. The process will takes approximately 7 days, and we will keep the diary with daily report.





Day 1

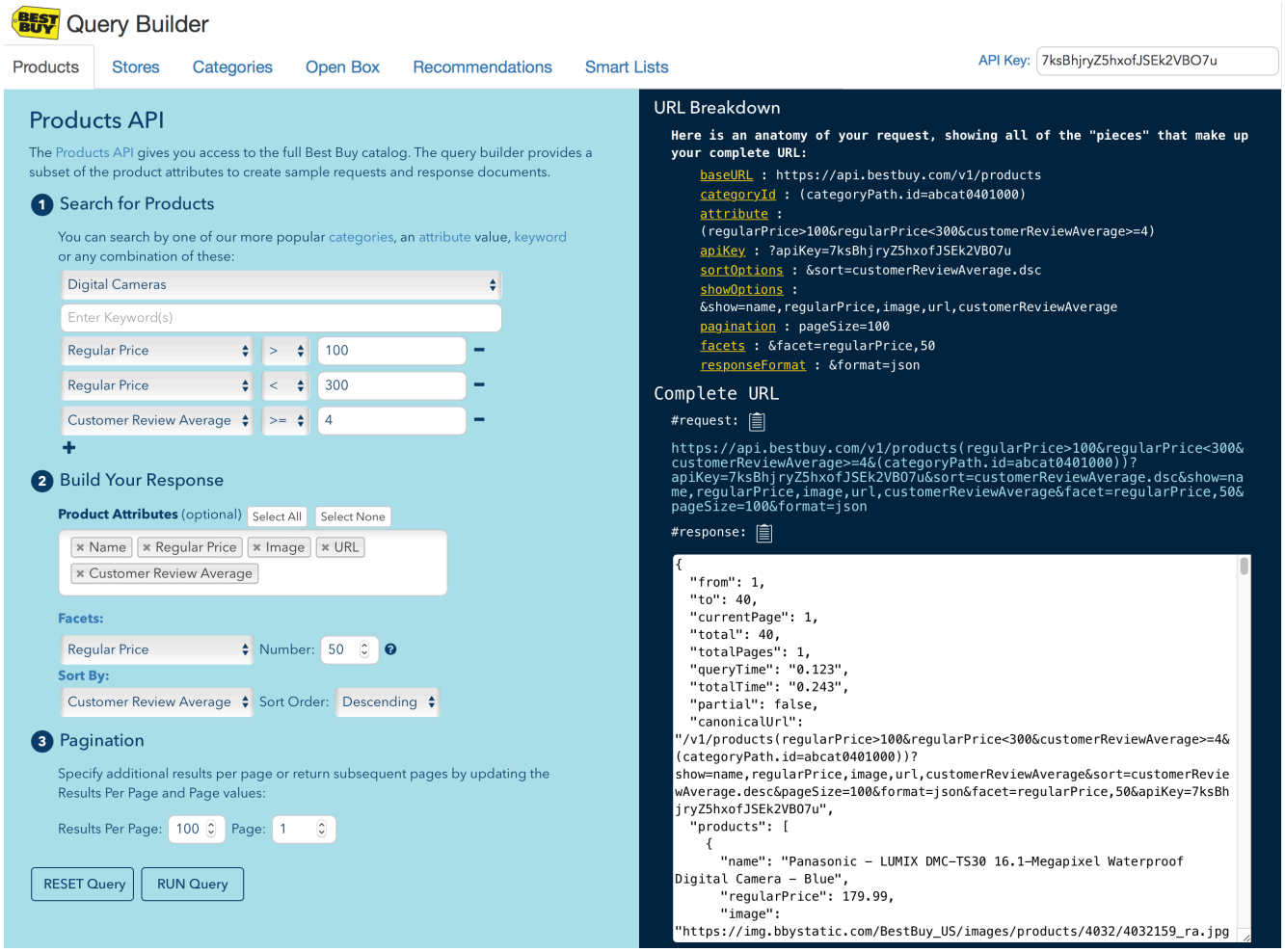
Project preparation.

The very first step - registration on BestBuy Development site and obtaining API key. To do this we registered on https://developer.bestbuy.com and feel application form to obtain API Key. This Key required to send requests to BestBuys database.

Learning Best Buy API.

The next step is to lear and experiment with BestBuy API (BB API). It takes some time to understand the structure, component, formats of API. The most important for us is Query Builder - http://bestbuyapis.github.io/bby-query-builder/#/productSearch Most of the time we spent to understand the structure of JSDON queries and responds.

For example, informal request - “Show me cameras around $200 with the best reviews” can be reformulated in formal request:



At the same time, on the background, we start architectural design and preparation for presentation of responses in more dynamic visual form.

To make this solution generic as possible, we will use basic Web Server and will build interactive chat page using only standard JavaScript.

Our Neural Network API published as Open Source under GNU license in GitHub, and we will add this solution into the same GitHub depository.

Local Development Environment.

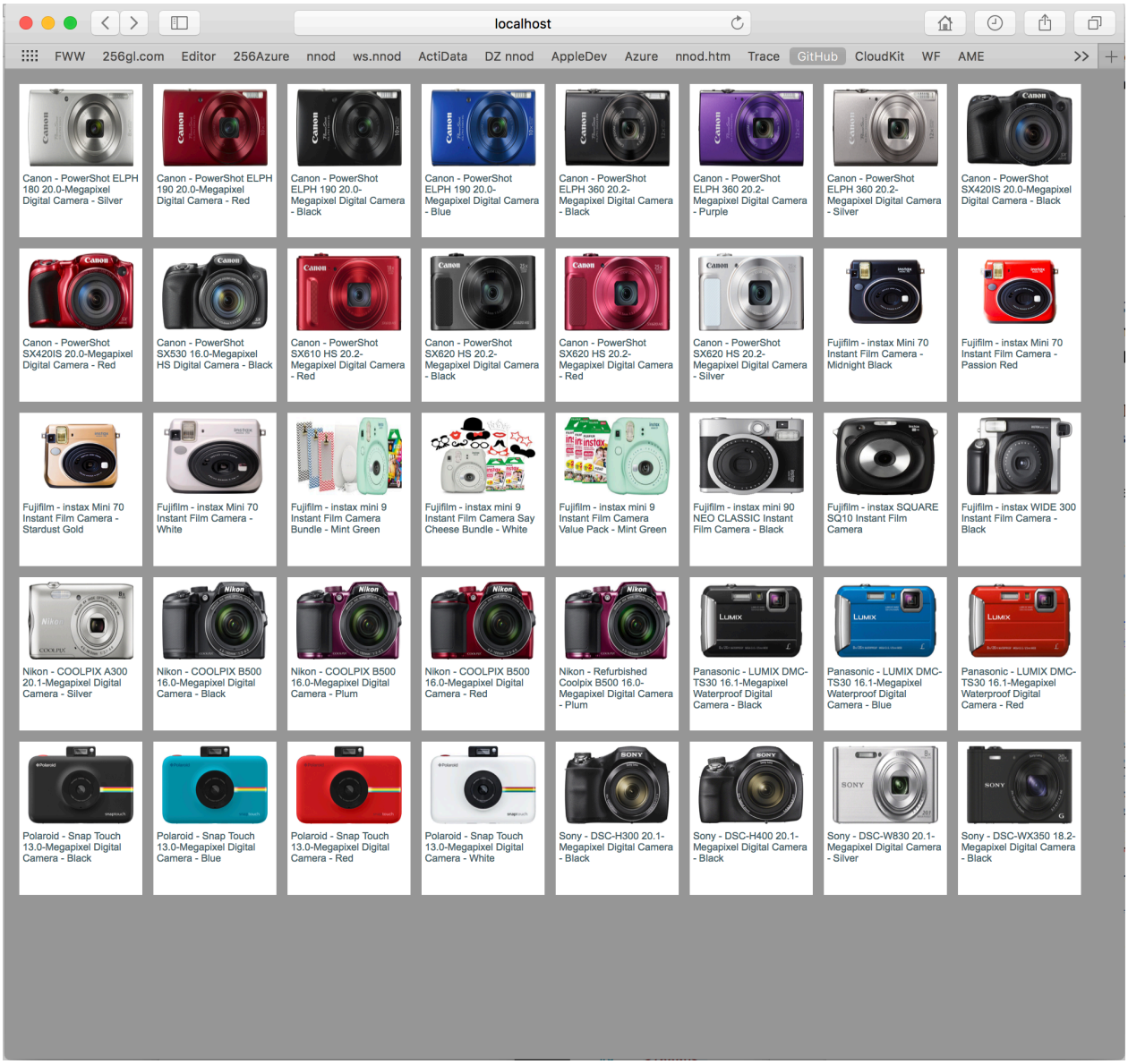
The whole process will be made in Mac OS but there are no any differences in the implementation for Windows. We will use Apache Web Server on Mac and IIS Web Server on Windows.

First PHP Script.

To make the very first call to BB API we can use PHP:

```
<body style="background-color:#999999;">
<?php
     $url = "https://api.bestbuy.com/v1/
     products(customerReviewAverage%3E=4&regularPrice%3E150&regularPrice%3C250&(ca
     tegoryPath.id=abcat0401000))?
     apiKey=xxxxxx&sort=name.asc&show=manufacturer,name,image,url,regularPrice&fac
     et=regularPrice,50&pageSize=100&format=json";
     $data = file_get_contents($url);
     $json = json_decode($data, true);
     $array = $json["products"];
     $db_counter = 1;
     foreach ($array as $obj) {
         $db_counter = $db_counter + 1;
         echo "<div class=\"thumbnail_wrapper\"><table cellspacing=\"0\"
     cellpadding=\"0\"><tr>\n" .
         "<td id=\"td_thumbnail_" . $db_counter . "\"
     class=\"td_thumbnail_image\">\n" .
         "<a href=\"#\"><img src=\"" . $obj['image']  . "\" height='70' width='95'
     " .
         "\" onclick=\"javascript:openThumbnailLink('" . $obj['url'] . "'); return
     false;\"></a></td>\n" .
         "</tr><tr><td id=\"td_thumbtitle_" . db_counter . "\"
     class=\"td_thumbnail_title\">\n" . " " . $obj['name'] . "\n" .
         "</td></tr></table></div> \n\n";
     }
     ?>
</body>
```

The result:


localhost
FWW 256gl.com Editor 256Azure nnod ws.nnod ActiData DZ nnod AppleDev Azure nnod.htm Trace GitHub CloudKit WF AME
Canon - PowerShot ELPH 180 20.0-Megapixel Digital Camera - Silver
Canon - PowerShot ELPH 190 20.0-Megapixel Digital Camera - Red
Canon - PowerShot ELPH 190 20.0-Megapixel Digital Camera - Black
Canon - PowerShot ELPH 190 20.0-Megapixel Digital Camera - Blue
Canon - PowerShot ELPH 360 20.2-Megapixel Digital Camera - Black
Canon - PowerShot ELPH 360 20.2-Megapixel Digital Camera - Purple
Canon - PowerShot ELPH 360 20.2-Megapixel Digital Camera - Silver
Canon - PowerShot SX420IS 20.0-Megapixel Digital Camera - Black
Canon - PowerShot SX420IS 20.0-Megapixel Digital Camera - Red
Canon - PowerShot SX530 16.0-Megapixel HS Digital Camera - Black
Canon - PowerShot SX610 HS 20.2-Megapixel Digital Camera - Red
Canon - PowerShot SX620 HS 20.2-Megapixel Digital Camera - Black
Canon - PowerShot SX620 HS 20.2-Megapixel Digital Camera - Red
Canon - PowerShot SX620 HS 20.2-Megapixel Digital Camera - Silver
Fujifilm - instax Mini 70 Instant Film Camera - Midnight Black
Fujifilm - instax Mini 70 Instant Film Camera - Passion Red
Fujifilm - instax Mini 70 Instant Film Camera - Stardust Gold
Fujifilm - instax Mini 70 Instant Film Camera - White
Fujifilm - instax mini 9 Instant Film Camera Bundle - Mint Green
Fujifilm - instax mini 9 Instant Film Camera Say Cheese Bundle - White
Fujifilm - instax mini 9 Instant Film Camera Value Pack - Mint Green
Fujifilm - instax mini 90 NEO CLASSIC Instant Film Camera - Black
Fujifilm - instax SQUARE SQ10 Instant Film Camera
Fujifilm - instax WIDE 300 Instant Film Camera - Black
Nikon - COOLPIX A300 20.1-Megapixel Digital Camera - Silver
Nikon - COOLPIX B500 16.0-Megapixel Digital Camera - Black
Nikon - COOLPIX B500 16.0-Megapixel Digital Camera - Plum
Nikon - COOLPIX B500 16.0-Megapixel Digital Camera - Red
Nikon - Refurbished Coolpix B500 16.0-Megapixel Digital Camera - Plum
Panasonic - LUMIX DMC-TS30 16.1-Megapixel Waterproof Digital Camera - Black
Panasonic - LUMIX DMC-TS30 16.1-Megapixel Waterproof Digital Camera - Blue
Panasonic - LUMIX DMC-TS30 16.1-Megapixel Waterproof Digital Camera - Red
Polaroid - Snap Touch 13.0-Megapixel Digital Camera - Black
Polaroid - Snap Touch 13.0-Megapixel Digital Camera - Blue
Polaroid - Snap Touch 13.0-Megapixel Digital Camera - Red
Polaroid - Snap Touch 13.0-Megapixel Digital Camera - White
Sony - DSC-H300 20.1-Megapixel Digital Camera - Black
Sony - DSC-H400 20.1-Megapixel Digital Camera - Black
Sony - DSC-W830 20.1-Megapixel Digital Camera - Silver
Sony - DSC-WX350 18.2-Megapixel Digital Camera - Black

Day 1 conclusion.

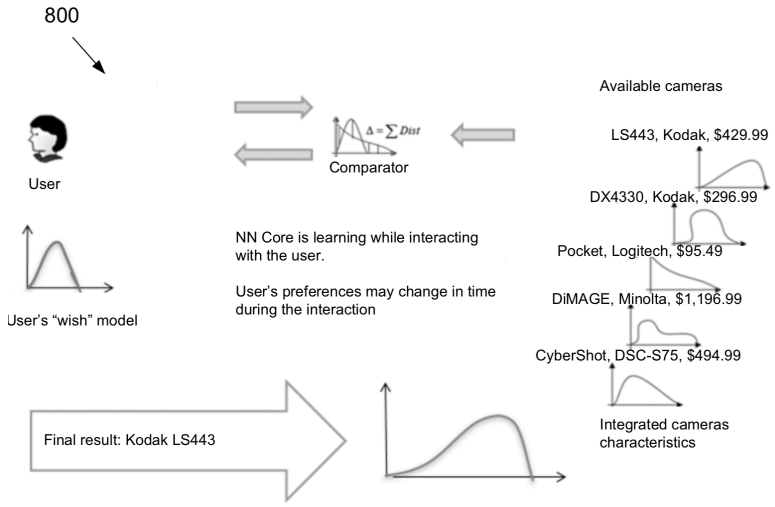
BB API Key obtained and we have full access to BB DataBase. The very first Web Page with implementation of requests to BB API built. Clear understanding of BB API now allow to start building Linguistic model for interactive search.

Day 2

Architectural/Marketing.

Value - one of the most critical questions needed to be answered before and during any development. What is the criteria we should put to measure the project advantages from similar? In our case we will use Cost of service and User's Information Demand satisfaction.

When User get an idea about buying something, he/she need to gather some information about the product. And before the very last moment when sale completed, the information for decision making will be gathered from many sources. Web, personal notes, social networks and finally expert are the network of participants in interactive process of finding the best possible item from many available in variety of sources.



Basically the process includes collecting data from different sources, compare result and repeat the process until the threshold level for the decision reached.

The cost of this process has two components: User's cost, which includes the time and potential difference if the item is wrong, or the same item can be purchased cheaper. And sale's coat, which includes the cost of consulting, and potential cost of loosing the client if he/she decided to switch to different store because of whatever reason.

We will use Best Buy Web site as one of the sources for measuring success. Criteria #1 will be based on the time required for the user to find enough information about the product and make decision to move forward and visit Best Buy or to switch to another retailer.

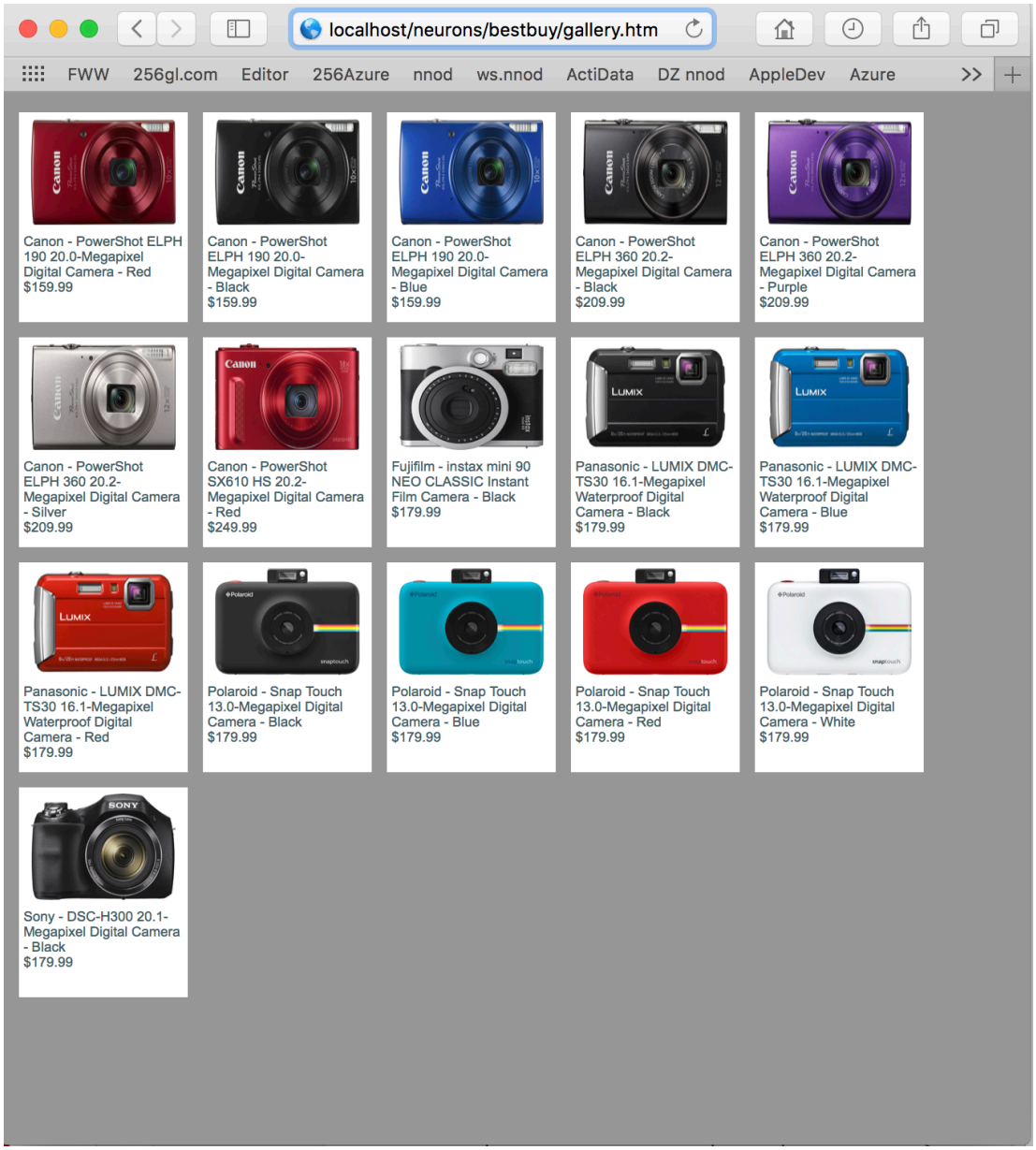
PHP -> JavaScript.

Even PHP is very popular and widely supported language, wherever it is possible we will try to use JavaScript for the reason of minimization of support and scalability. If our solution will be fully JavaScript based and will not require any external server support, but only BB API, that's mean we automatically solve the problem of scalability.

Changing PHP to JavaScript is relatively easy:

```
<!DOCTYPE HTML>
<html>
<head>
    <meta http-equiv="X-UA-Compatible" content="IE=edge" />
    <meta http-equiv="content-type" content="text/html; charset=UTF-8" />
    <meta name="apple-mobile-web-app-capable" content="yes" />
    <meta name="apple-mobile-web-app-status-bar-style" content="black" />
    <meta name="viewport" content="minimum-scale=1.0, maximum-scale=5.0, user-
scalable=yes, initial-scale=1.0" />
    <meta name="viewport" content="user-scalable=yes">

    <title>256gl NNOD</title>
    <link rel="stylesheet" type="text/css" href="style.css" />
    <script type="text/javascript">
        function openThumbnailLink(url) {
            window.open(url, "_blank", "toolbar=no, scrollbars=yes, resizable=yes,
top=10, left=10, width=800, height=800");
            return true;
        };
    </script>
</head>
<body style="background-color:#999999;">
    <div id="demo"></div>
    <script>
        var xmlhttp = new XMLHttpRequest();
        xmlhttp.onreadystatechange = function() {
            if (this.readyState == 4 && this.status == 200) {
                var myObj = JSON.parse(this.responseText);
                var result = myObj.products;
                var x = "";
                for (i in result) {
                    x = x + "<div class=\"thumbnail_wrapper\"><table
cellspacing=\"0\" cellpadding=\"0\"><tr>\n" +
                        "<td id=\"td_thumbnail_" + i + "\"
class=\"td_thumbnail_image\">\n" +
                        "<a href=\"#\"><img src=\"" + result[i].image + "\"
height='70' width='95' " +
                        "\" onclick=\"javascript:openThumbnailLink('" +
result[i].url + "'); return false;\"></a></td>\n" +
                        "</tr><tr><td id=\"td_thumbtitle_" + i + "\"
class=\"td_thumbnail_title\">\n" + " " + result[i].name + "<br>$" +
result[i].regularPrice + "\n" +
```

```
                    "</td></tr></table></div> \n\n";
                }
                document.getElementById("demo").innerHTML = x;
            }
        };
        url = "https://api.bestbuy.com/v1/
products(customerReviewAverage%3E=4&regularPrice%3E150&regularPrice%3C250&(categor
yPath.id=abcat0401000))?
apiKey=xxxxxx&sort=name.asc&show=manufacturer,name,image,url,regularPrice&facet=re
gularPrice,50&pageSize=100&format=json";
        xmlhttp.open("GET", url, true);
        xmlhttp.send();
    </script>
</body>
</html>
```



Parameters in HTTP Request

BB API allows to send request only with certain relatively restricted set of parameters. Currently we can only request products defined by: Category, CustomerReview, Manufacturer, Color and price. The formal request to BB Database then can be build only with variety of these parameters.

We will use basic HTTP Get method:

http://localhost/neurons/bestbuy/gallery.htm?color=silver&manufacturer=apple&customerReviewAverage=3&price=1500

Our request page (gallery.htm) have basic arguments parser and few logical adjustments.

It is almost impossible in informal request define price as an exact number, so we will convert the price into the range and if no exact criteria provided, the price for request will be calculated as:

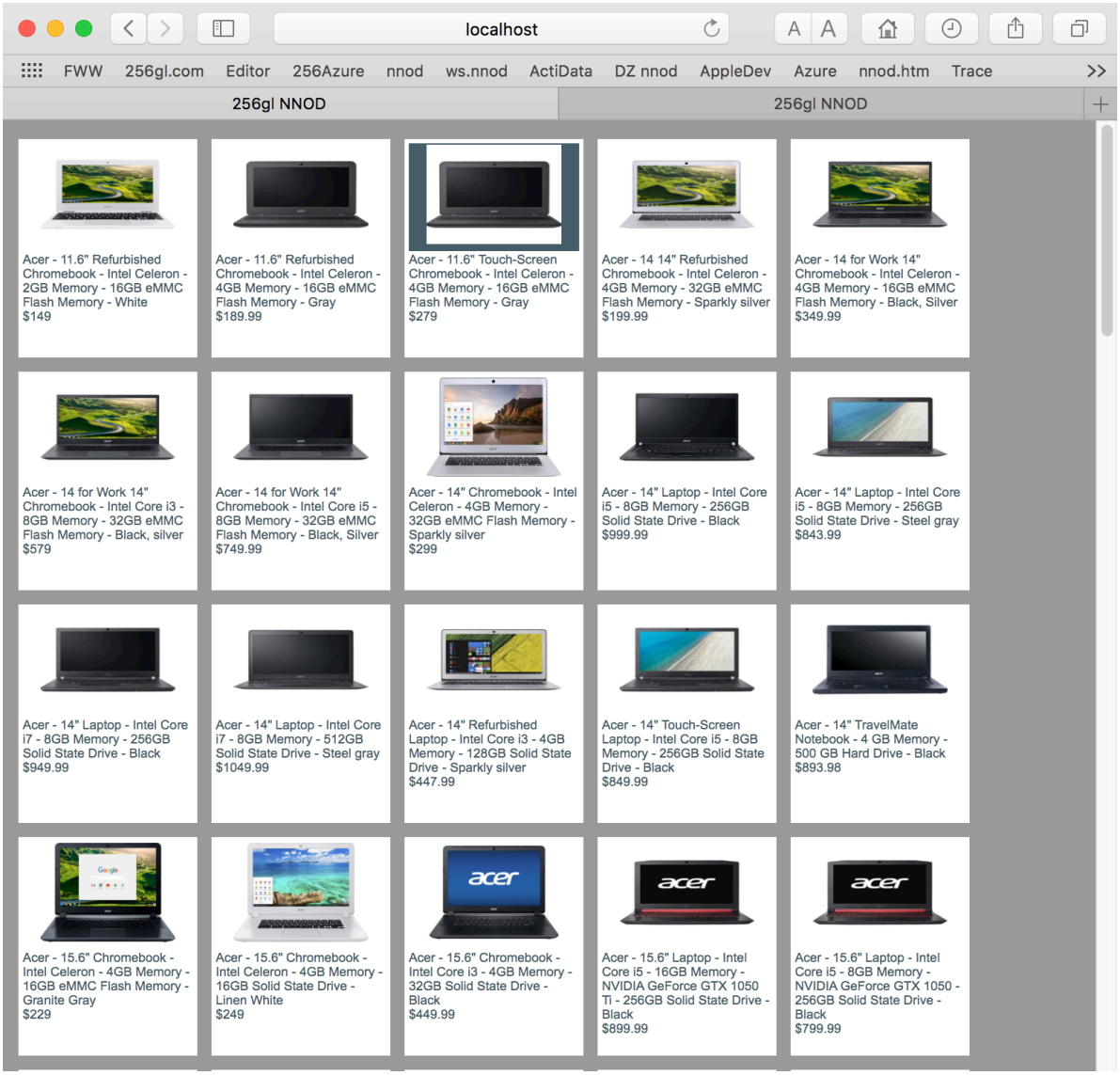
```
regularPrice_gt = price - Math.round(price / 4)
regularPrice_lt = price + Math.round(price / 4)

price >= regularPrice_gt && price <= regularPrice_lt
```

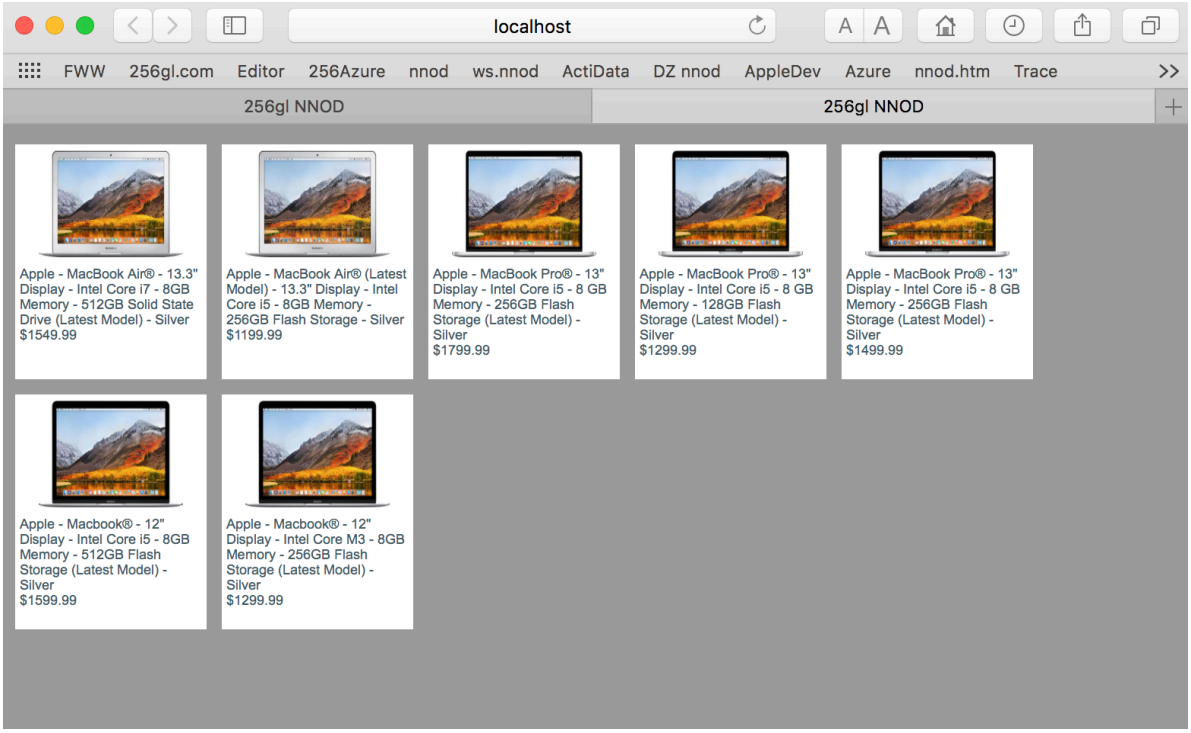
The whole arguments parsing for the page is following:

```
var api_key = "7ksBhjryZ5hxofJSEk2VBO7u";
var baseURL = "https://api.bestbuy.com/v1/products";
var categoryId = get_arguments["categoryId"];
if (categoryId === undefined)  categoryId = "abcat0502000";

//        abcat0502000 - Laptops
//        abcat0501000 - Computers
//        abcat0401000 - Cameras
//        pcmcat209400050001 - phones
//        abcat0204000 - Hesad phones
//        pcmcat241600050001 - Home Audio
//        pcmcat254000050002 - Home Automation
//        pcmcat209000050006 - iPads
//        abcat0904000 - Ovens
//        abcat0901000 - Refrigirators
//        abcat0101000 - TVs
//        abcat0910000 - Washers
//        pcmcat310200050004 -Speakers

var customerReviewAverage = get_arguments["customerReviewAverage"];
```

```
if (customerReviewAverage === undefined)
{
      customerReviewAverage = "";
}else
{
      customerReviewAverage = customerReviewAverage - 0.1
      customerReviewAverage = "&customerReviewAverage>=" + customerReviewAverage;
}
var manufacturer = get_arguments["manufacturer"];
if (manufacturer === undefined)
{
      manufacturer = "";
}else
{
      manufacturer = "&manufacturer=" + manufacturer;
}
var color = get_arguments["color"];
if (color === undefined)
{
      color = "";
}else
{
      color = "&color=" + color;
}
var regularPrice_gt = 0;
var regularPrice_lt = 100000;
var price = get_arguments["price"];
if (price === undefined || price === "")
{
      price = "regularPrice>=" + regularPrice_gt +
            "&regularPrice<=" + regularPrice_lt;
}else
{
      regularPrice_gt = Math.round(price) - Math.round(price / 4);
      regularPrice_lt = Math.round(price) + Math.round(price / 4);
      price = "regularPrice>=" + regularPrice_gt +
            "&regularPrice<=" + regularPrice_lt;

}
var url = baseURL + "(" + price + customerReviewAverage + manufacturer + color +
"&(categoryPath.id=" + categoryId + "))" +
"?apiKey=" + api_key +
"&sort=name.asc&show=manufacturer,name,image,url,regularPrice&facet=regularPrice,
50&pageSize=100&format=json";
```

With this update we can now request different category of products and update search criteria.


localhost
FWW 256gl.com Editor 256Azure nnod ws.nnod ActiData DZ nnod AppleDev Azure nnod.htm Trace
256gl NNOD
256gl NNOD
Acer - 11.6" Refurbished Chromebook - Intel Celeron - 2GB Memory - 16GB eMMC Flash Memory - White $149
Acer - 11.6" Refurbished Chromebook - Intel Celeron - 4GB Memory - 16GB eMMC Flash Memory - Gray $189.99
Acer - 11.6" Touch-Screen Chromebook - Intel Celeron - 4GB Memory - 16GB eMMC Flash Memory - Gray $279
Acer - 14 14" Refurbished Chromebook - Intel Celeron - 4GB Memory - 32GB eMMC Flash Memory - Sparkly silver $199.99
Acer - 14 for Work 14" Chromebook - Intel Celeron - 4GB Memory - 16GB eMMC Flash Memory - Black, Silver $349.99
Acer - 14 for Work 14" Chromebook - Intel Core i3 - 8GB Memory - 32GB eMMC Flash Memory - Black, silver $579
Acer - 14 for Work 14" Chromebook - Intel Core i5 - 8GB Memory - 32GB eMMC Flash Memory - Black, Silver $749.99
Acer - 14" Chromebook - Intel Celeron - 4GB Memory - 32GB eMMC Flash Memory - Sparkly silver $299
Acer - 14" Laptop - Intel Core i5 - 8GB Memory - 256GB Solid State Drive - Black $999.99
Acer - 14" Laptop - Intel Core i5 - 8GB Memory - 256GB Solid State Drive - Steel gray $843.99
Acer - 14" Laptop - Intel Core i7 - 8GB Memory - 256GB Solid State Drive - Black $949.99
Acer - 14" Laptop - Intel Core i7 - 8GB Memory - 512GB Solid State Drive - Steel gray $1049.99
Acer - 14" Refurbished Laptop - Intel Core i3 - 4GB Memory - 128GB Solid State Drive - Sparkly silver $447.99
Acer - 14" Touch-Screen Laptop - Intel Core i5 - 8GB Memory - 256GB Solid State Drive - Black $849.99
Acer - 14" TravelMate Notebook - 4 GB Memory - 500 GB Hard Drive - Black $893.98
Acer - 15.6" Chromebook - Intel Celeron - 4GB Memory - 16GB eMMC Flash Memory - Granite Gray $229
Acer - 15.6" Chromebook - Intel Celeron - 4GB Memory - 16GB Solid State Drive - Linen White $249
Acer - 15.6" Chromebook - Intel Core i3 - 4GB Memory - 32GB Solid State Drive - Black $449.99
Acer - 15.6" Laptop - Intel Core i5 - 16GB Memory - NVIDIA GeForce GTX 1050 Ti - 256GB Solid State Drive - Black $899.99
Acer - 15.6" Laptop - Intel Core i5 - 8GB Memory - NVIDIA GeForce GTX 1050 - 256GB Solid State Drive - Black $799.99


localhost
FWW 256gl.com Editor 256Azure nnod ws.nnod ActiData DZ nnod AppleDev Azure nnod.htm Trace
256gl NNOD
256gl NNOD
Apple - MacBook Air® - 13.3" Display - Intel Core i7 - 8GB Memory - 512GB Solid State Drive (Latest Model) - Silver $1549.99
Apple - MacBook Air® (Latest Model) - 13.3" Display - Intel Core i5 - 8GB Memory - 256GB Flash Storage - Silver $1199.99
Apple - MacBook Pro® - 13" Display - Intel Core i5 - 8 GB Memory - 256GB Flash Storage (Latest Model) - Silver $1799.99
Apple - MacBook Pro® - 13" Display - Intel Core i5 - 8 GB Memory - 128GB Flash Storage (Latest Model) - Silver $1299.99
Apple - MacBook Pro® - 13" Display - Intel Core i5 - 8 GB Memory - 256GB Flash Storage (Latest Model) - Silver $1499.99
Apple - Macbook® - 12" Display - Intel Core i5 - 8GB Memory - 512GB Flash Storage (Latest Model) - Silver $1599.99
Apple - Macbook® - 12" Display - Intel Core M3 - 8GB Memory - 256GB Flash Storage (Latest Model) - Silver $1299.99

Day 3

Map Informal Requests into Formal Queries