深入探索HTTP协议的奥秘

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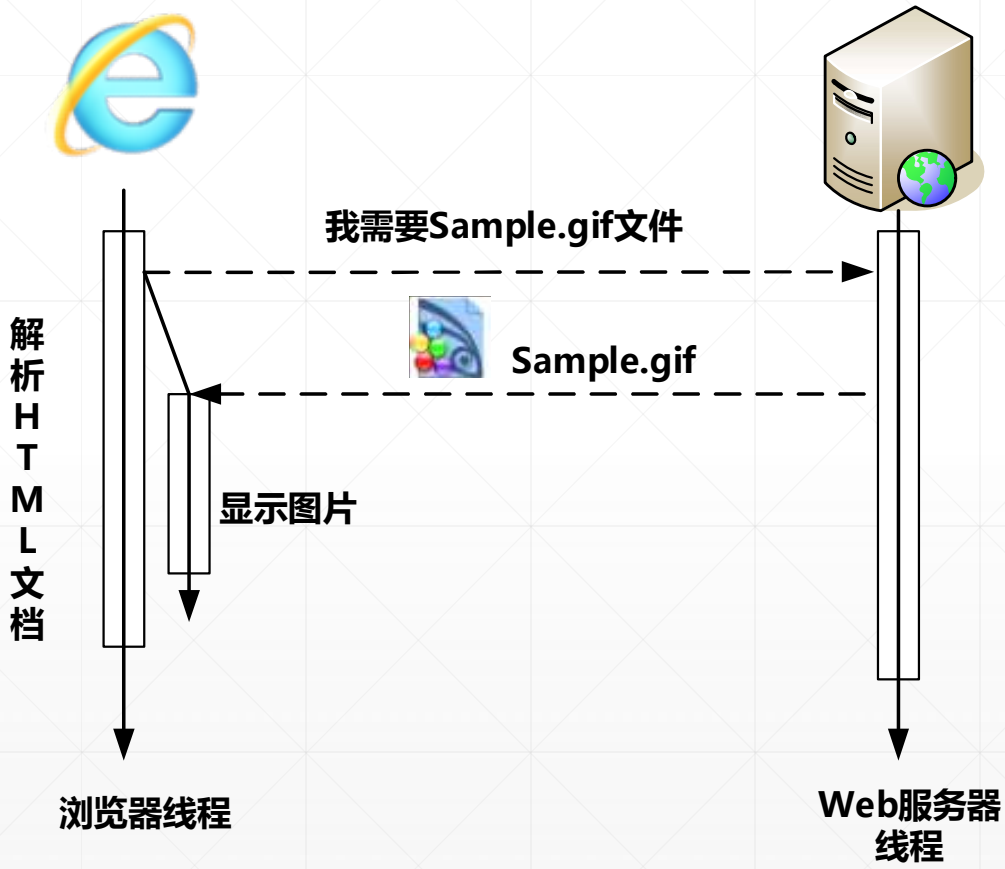
熟练掌握几个探索HTTP奥秘的工具

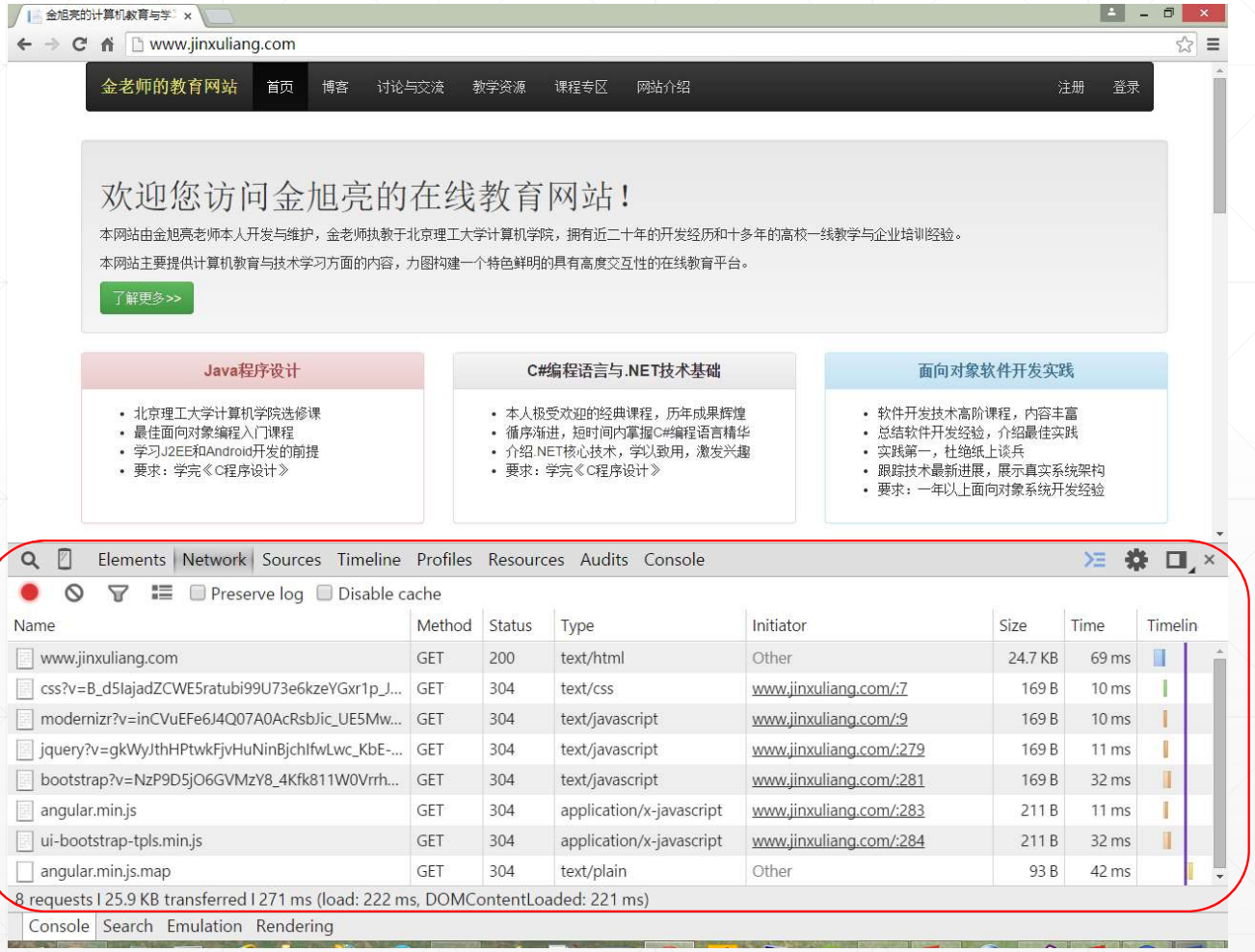
Chrome Developer Tools	• 浏览器自带的开发工具，分析网页与HTTP请求和响应的利器
Fiddler	• 功能强大的通用HTTP开发与调试工具
HttpClient	• .NET所提供的简单易用的组件，可以方便地编程访问Web资源

Chrome Developer Tools

场景：浏览器是怎样解析HTML网页的？



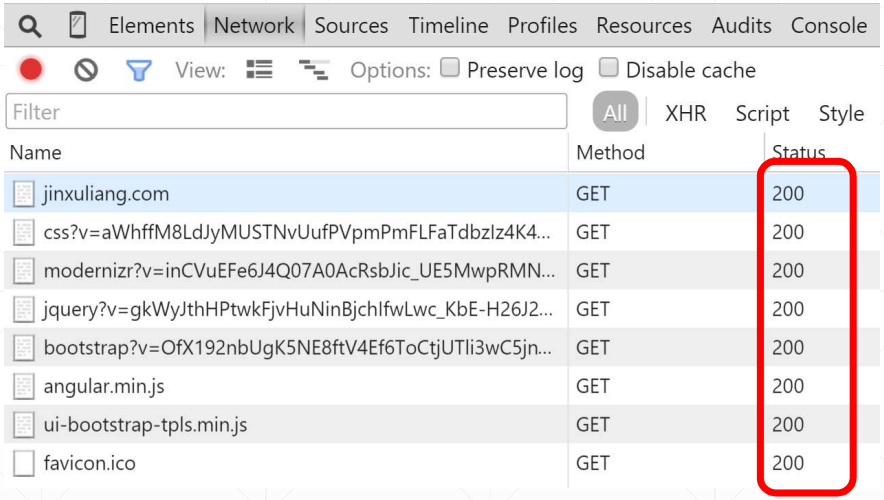
显示一个网页需多次从Web Server提取数据

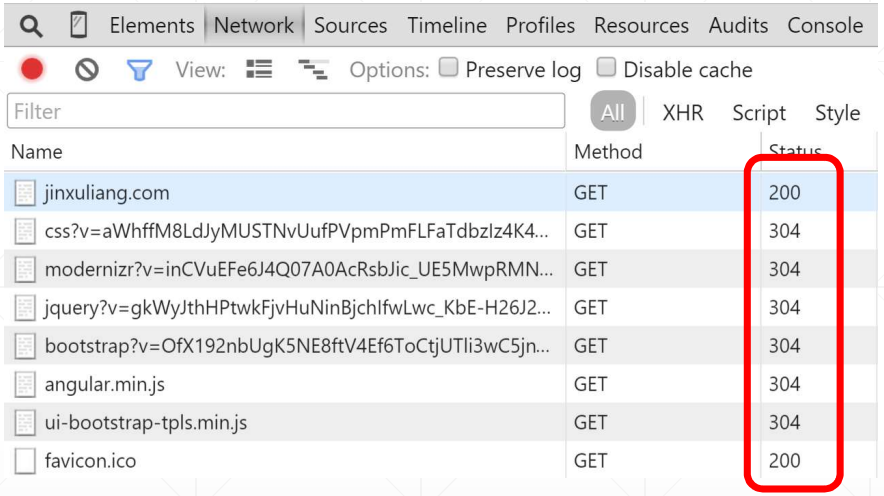


使用浏览器配置的开发工具（通常使用F12键调出来），可以直观地看到浏览器网页的解析过程

浏览器在显示一个包含有多种类型资源（图片、视频、文字等）的复杂Web网页时，通常需要向Web Server发出多次HTTP请求。

试验：使用Chrome分析“浏览器端的数据缓冲”特性



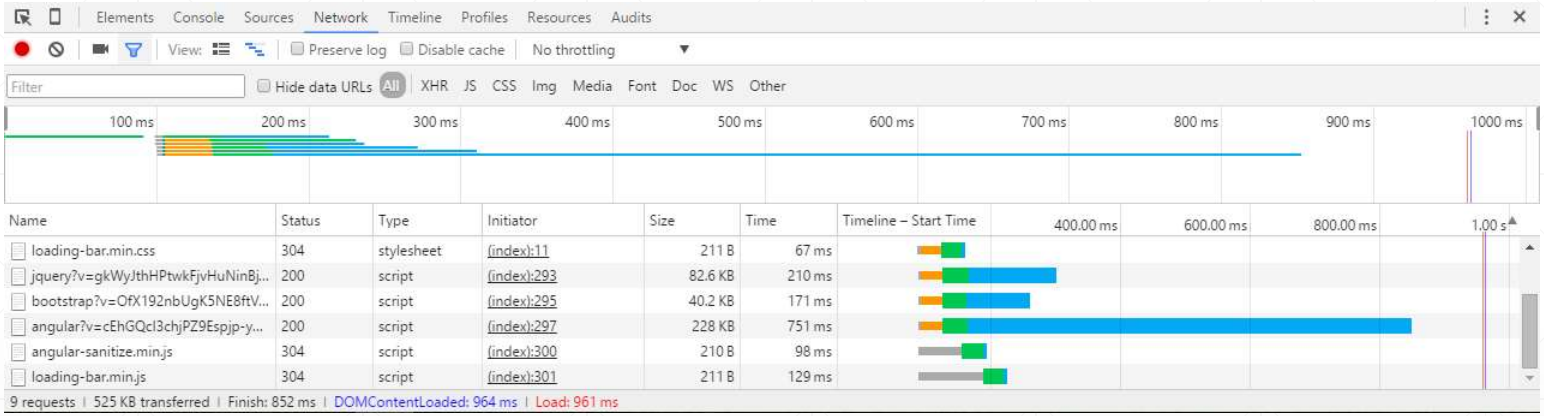


第一次访问，状态码都是200

刷新，不少状态码变为了304……

利用数据缓存原理，人们在开发中广泛使用了“**CDN（Content Delivery Network）**”技术以减少不必要的数据传输，加快网页的呈现。

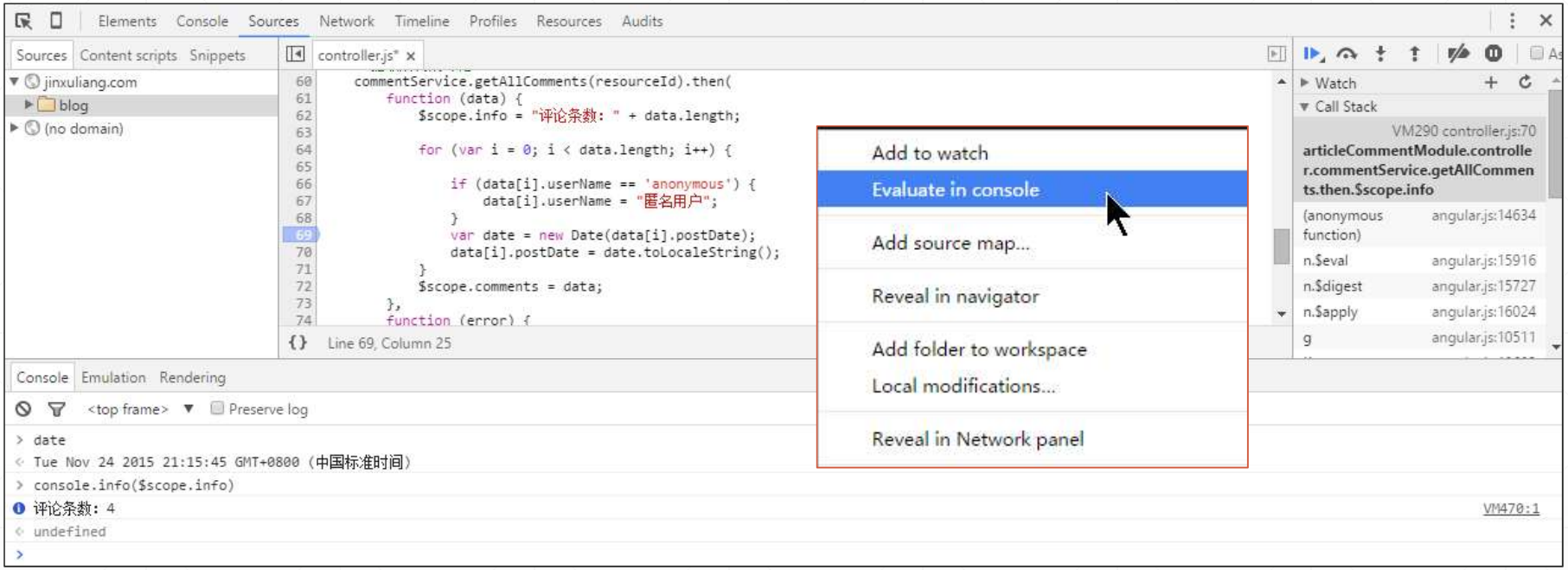
掌握Chrome Developer Tools的几招-1



快速定位并查看指定部分的HTML代码

Network选项卡：查看访问特定网页所发出的所有HTTP请求和响应，分析网页显示速度慢的瓶颈所在。

掌握Chrome Developer Tools的几招-2



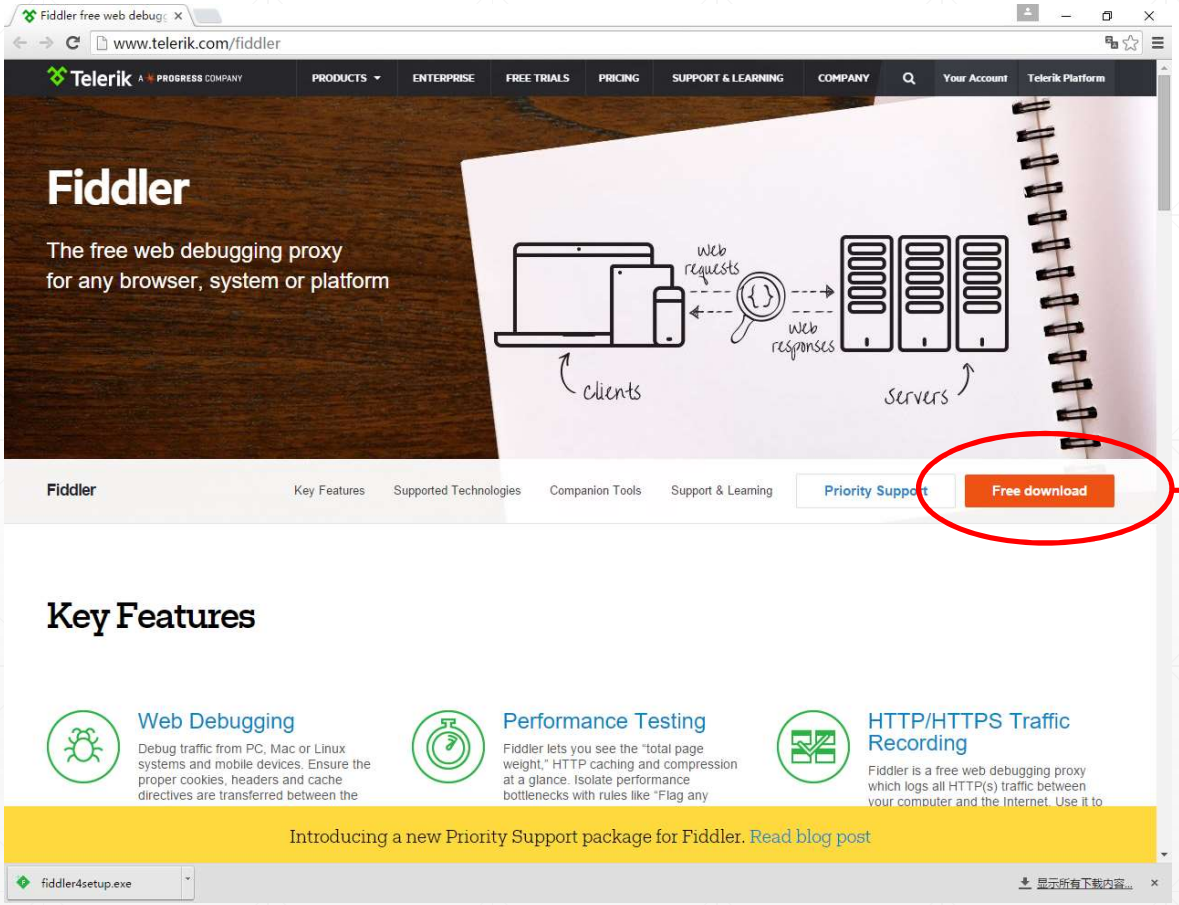
使用Source选项卡，可以查看网页中的JavaScript代码，并且可以设置断点单步跟踪；选中部分代码，右击，选“Evaluate in console”，可以在Console面板中执行并显示结果。

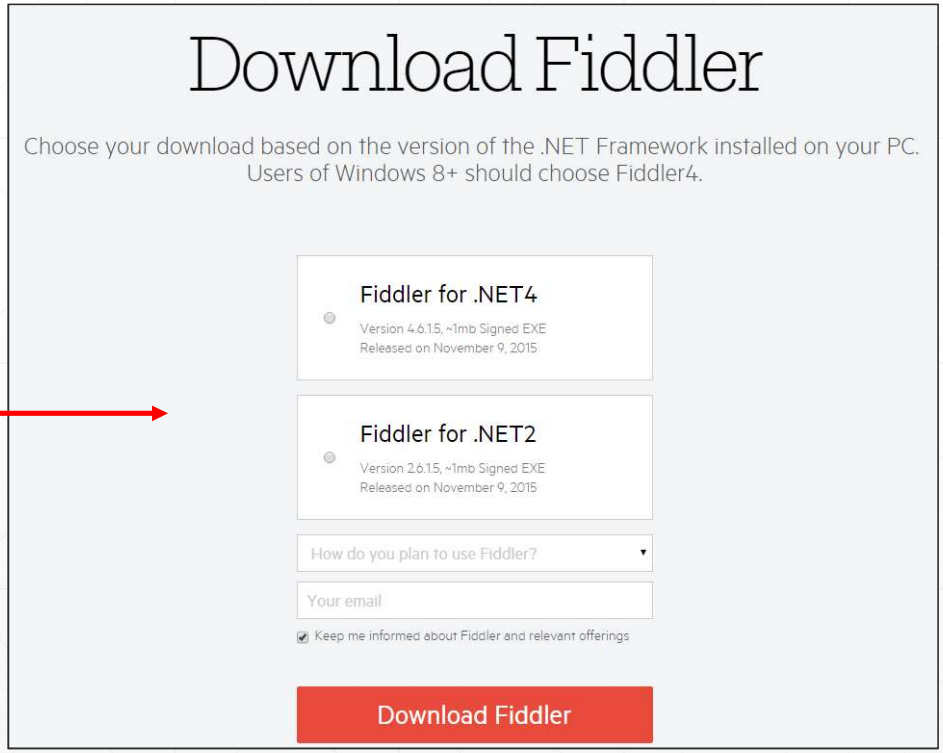
在Console选项卡中使用“console.info(JS对象)”，可以查看到所有指定对象的相关属性及方法。

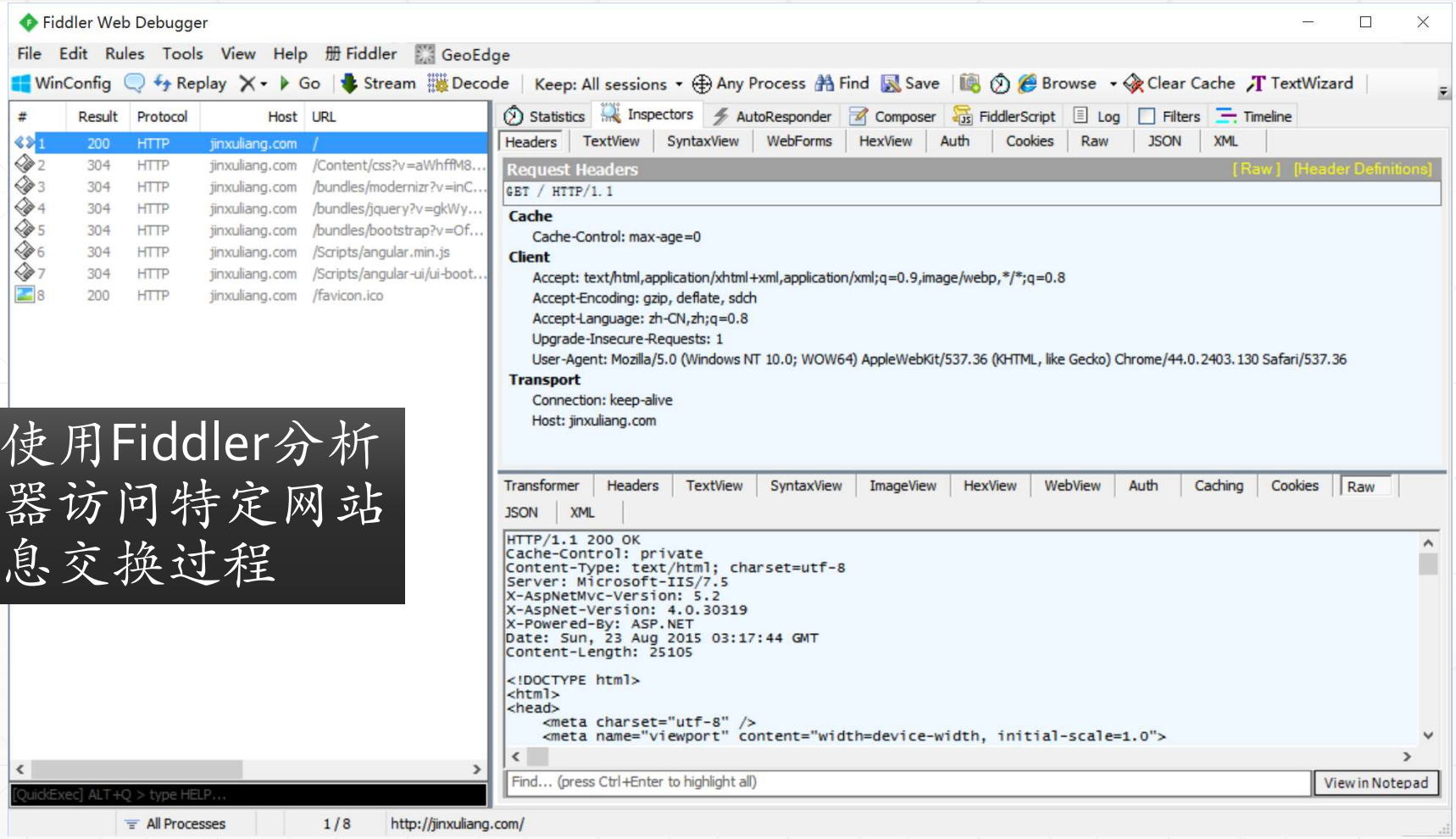
Fiddler

下载并安装Fiddler

http://www.telerik.com/download/fiddler

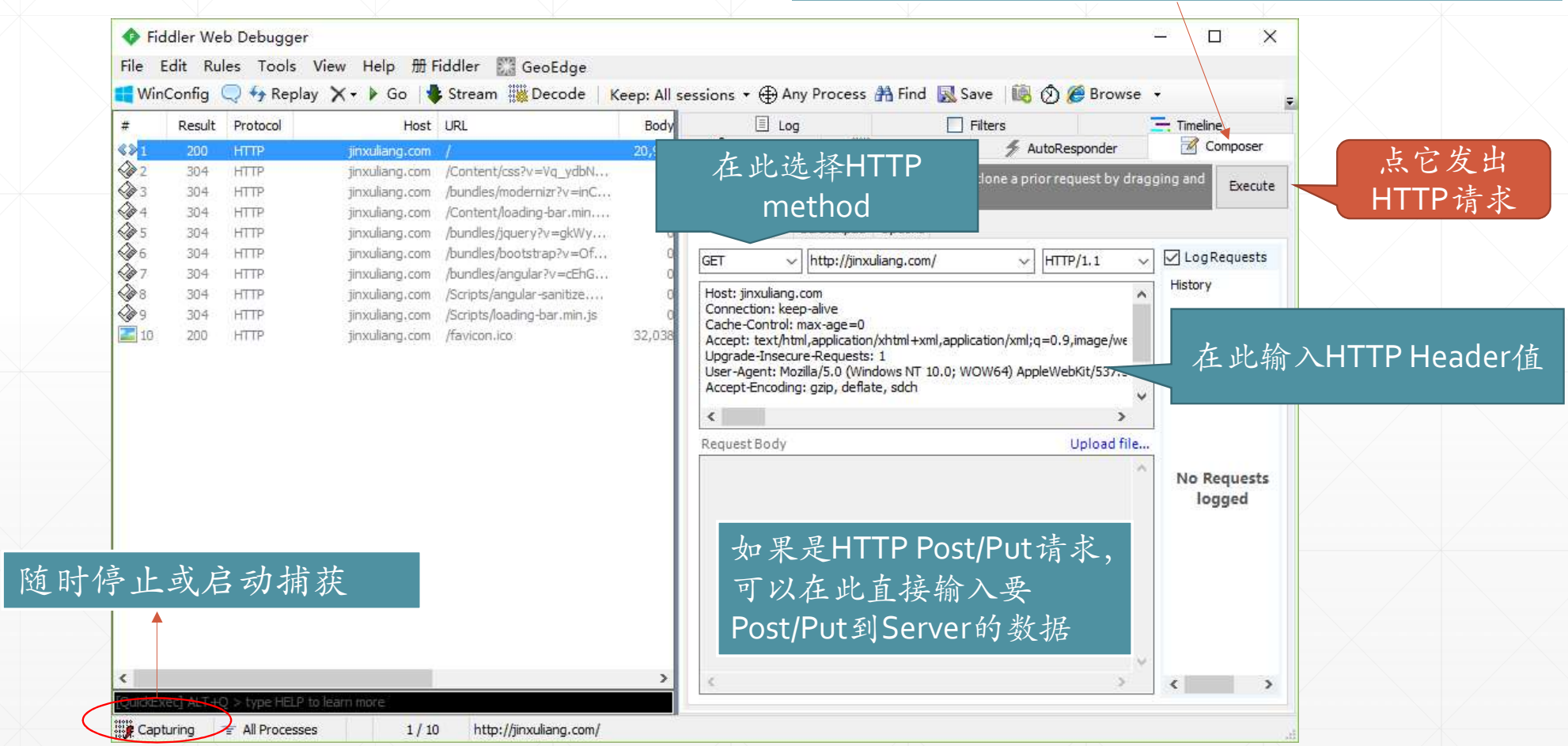






可以使用Fiddler分析浏览器访问特定网站的信息交换过程

Fiddler的基础使用技巧



HttpClient简介

使用HttpClient

HttpClient可用于取代原先基类库中System.Net命名空间中的WebClient、WebRequest、WebResponse等组件，更简单易用。

HttpClient使用HttpRequestMessage/HttpResponseMessage封装请求与响应消息，支持async/await异步编程模式，可以同时向多个URI（甚至是跨域的）发出HTTP请求。

只要你了解一些HTTP的基础知识，你会发现HttpClient及相关类型的封装相当直观……

HttpClient类所定义的属性与方法

HttpClient
Class
HttpMessageInvoker

Properties
- BaseAddress : Uri
- DefaultRequestHeaders : HttpRequestHeaders
- MaxResponseContentBufferSize : long
- Timeout : TimeSpan

Methods
- CancelPendingRequests() : void
- DeleteAsync() : Task<HttpResponseMessage> (+ 3 overloads)
- Dispose() : void
- GetAsync() : Task<HttpResponseMessage> (+ 7 overloads)
- GetByteArrayAsync() : Task<byte[]> (+ 1 overload)
- GetStreamAsync() : Task<Stream> (+ 1 overload)
- GetStringAsync() : Task<string> (+ 1 overload)
- HttpClient() (+ 2 overloads)
- PostAsync() : Task<HttpResponseMessage> (+ 3 overloads)
- PutAsync() : Task<HttpResponseMessage> (+ 3 overloads)
- SendAsync() : Task<HttpResponseMessage> (+ 3 overloads)

HttpClientExtensions
Static Class

Methods
- PostAsJsonAsync<T> (+ 3 overloads)
- PostAsXmlAsync<T> (+ 3 overloads)
- PostAsync<T> (+ 9 overloads)
- PutAsJsonAsync<T> (+ 3 overloads)
- PutAsXmlAsync<T> (+ 3 overloads)
- PutAsync<T> (+ 9 overloads)

有几个扩展方法，直接支持以Post和Put方式提交Json和Xml数据到服务端

HttpRequestHeaders
Sealed Class
HttpHeaders

Properties

- Accept : HttpHeaderValueCollection<MediaTypeWithQualityHeaderValue>
- AcceptCharset : HttpHeaderValueCollection<StringWithQualityHeaderValue>
- AcceptEncoding : HttpHeaderValueCollection<StringWithQualityHeaderValue>
- AcceptLanguage : HttpHeaderValueCollection<StringWithQualityHeaderValue>
- Authorization : AuthenticationHeaderValue
- CacheControl : CacheControlHeaderValue
- Connection : HttpHeaderValueCollection<string>
- ConnectionClose : bool?
- Date : DateTimeOffset?
- Expect : HttpHeaderValueCollection<NameValueWithParametersHeaderValue>
- ExpectContinue : bool?
- From : string
- Host : string
- IfMatch : HttpHeaderValueCollection<EntityTagHeaderValue>
- IfModifiedSince : DateTimeOffset?
- IfNoneMatch : HttpHeaderValueCollection<EntityTagHeaderValue>
- IfRange : RangeConditionHeaderValue
- IfUnmodifiedSince : DateTimeOffset?
- MaxForwards : int?
- Pragma : HttpHeaderValueCollection<NameValueHeaderValue>
- ProxyAuthorization : AuthenticationHeaderValue
- Range : RangeHeaderValue
- Referrer : Uri
- TE : HttpHeaderValueCollection<TransferCodingWithQualityHeaderValue>
- Trailer : HttpHeaderValueCollection<string>
- TransferEncoding : HttpHeaderValueCollection<TransferCodingHeaderValue>
- TransferEn
- Upgrade :
- UserAgent
- Via : Http
- Warning :

这些属性，都直接对应着HTTP协议中所规定的标准HTTP Header。

HttpClient的DefaultRequestHeaders引用一个HttpRequestHeaders对象，可以设定Http Header值。

基类HttpHeaders可以添加和移除HTTP Header。

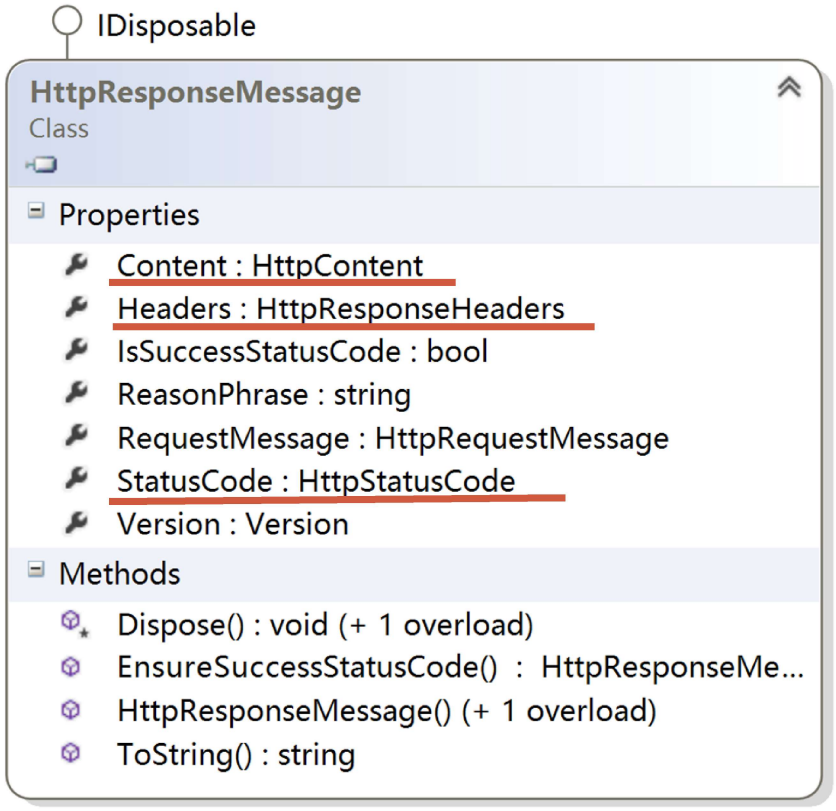
IEnumerable<KeyValuePair<string, IEnumerable<string>>>
IEnumerable

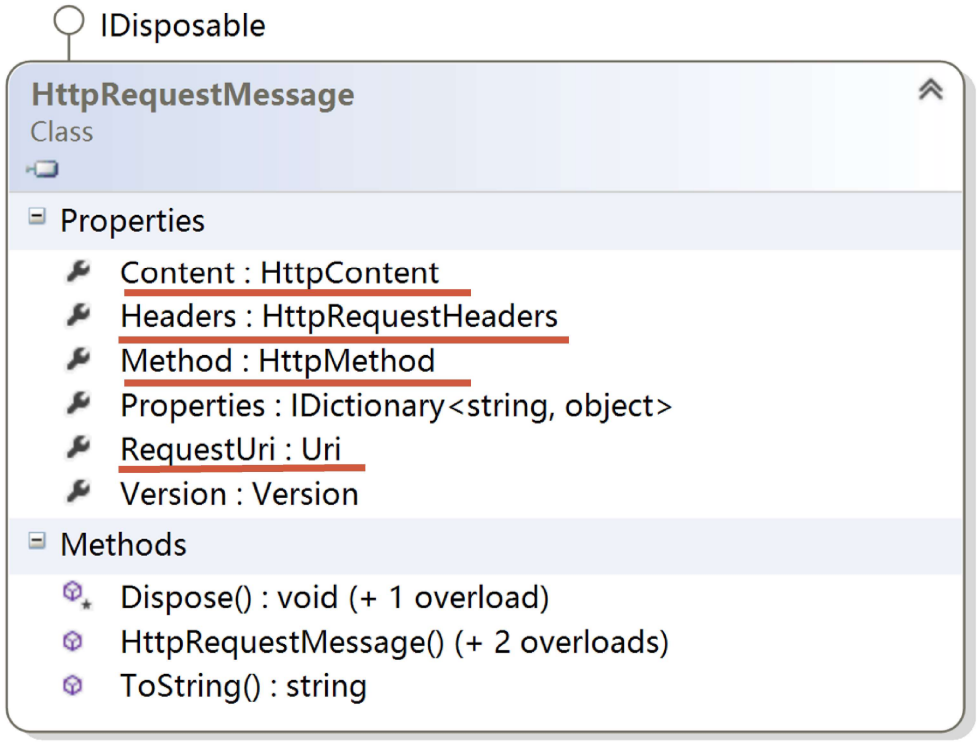
HttpHeaders
Abstract Class

Methods

- Add() : void (+ 1 overload)
- Clear() : void
- Contains() : bool
- GetEnumerator() : IEnumerator<KeyValuePair<string, IEnumerable<string>>>
- GetValues() : IEnumerable<string>
- HttpHeaders()
- Remove() : bool
- ToString() : string
- TryAddWithoutValidation() : bool (+ 1 overload)
- TryGetValues() : bool

HTTP请求和响应消息，被封装为**HttpResponseMessage**和**HttpRequestMessage**类

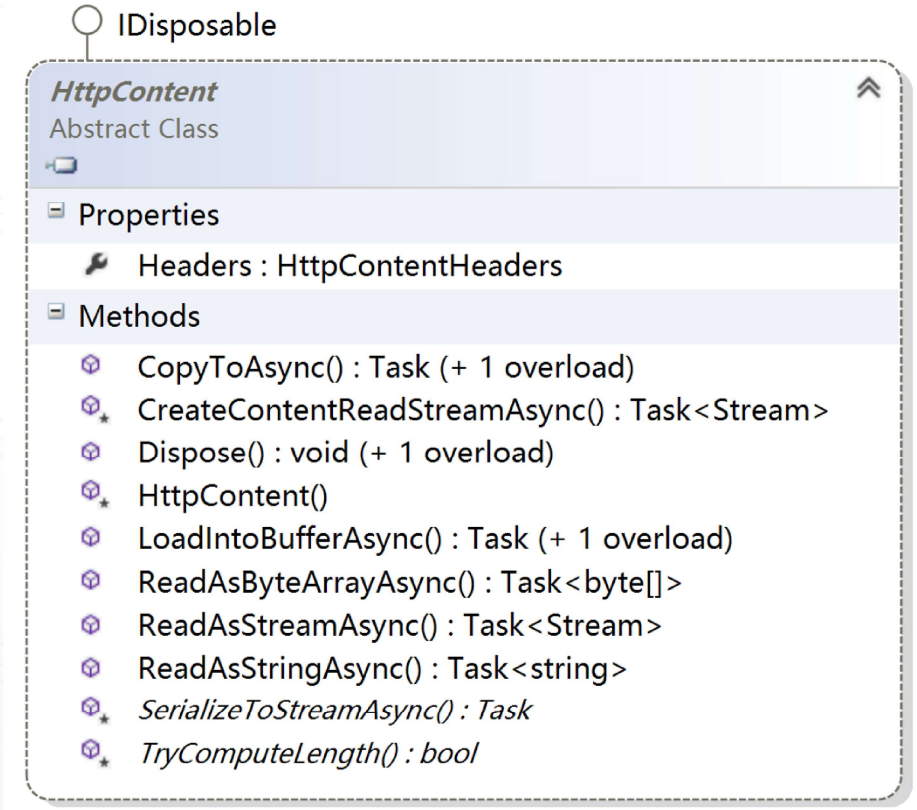


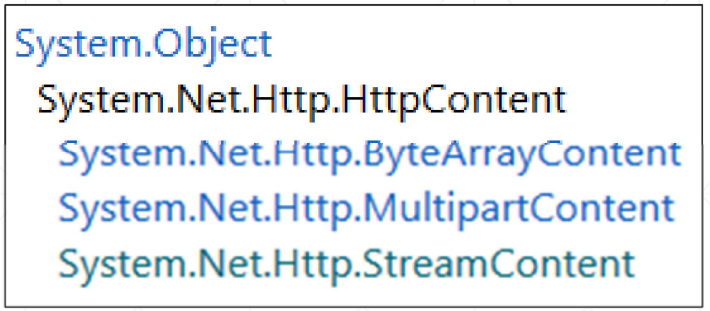


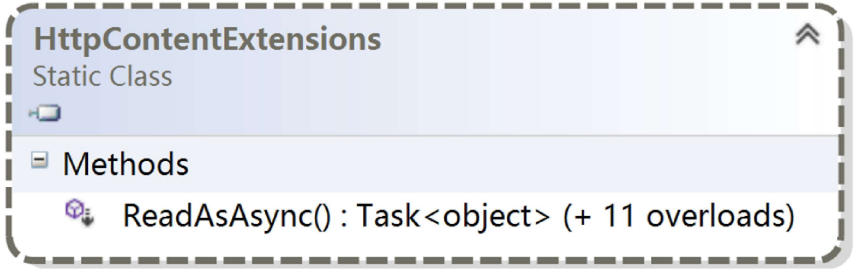
HttpClient的GetAsync()/PostAsync()等方法返回HttpResponseMessage对象。

HttpClient的SendAsync()方法以HttpRequestMessage对象为方法参数

HTTP消息的主体抽象为HttpContent类型，并且定义了几个子类。







HttpConent自己和一组扩展方法提供了读取HttpContent的便捷手段。

HttpClient基本编程技巧

使用HttpClient组件发出Get请求

使用HttpClient组件，向Web Server发出一个HTTP Get请求，并且通过指定“Accept:application/json”指明期望接收Json数据。

```
static HttpClient getHttpClient()
{
    var client = new HttpClient();
    client.BaseAddress = new Uri("http://localhost:12623");
    //设定HTTP Header，指定期望接收JSON字符串
    client.DefaultRequestHeaders.Add("Accept", "application/json ");
    return client;
}
```

```
static async Task TestGetFromWebServer()
{
    Console.WriteLine("向Web Server发出HTTP GET请求：\n");
    var client = getHttpClient();

    Console.WriteLine("\n收到服务器发回的数据:");
    string result = await client.GetStringAsync("api/myservice");
    Console.WriteLine(result);
}
```

HttpClient组件提供了一组异步方法，可以发出HTTP请求，其返回值则封装了从Web Server返回的数据

服务器响应HTT请求

指明本方法只响应HTTP Get请求

```
[HttpGet]
0 references
public IActionResult Get()
{
    Response.StatusCode = 200;
    return Json(new MyClass()
    {
        Info = "Web Server发回的Json格式信息",
        Id = 100
    });
}
```

设定响应码

将MyClass对象序列化为Json字符串之后，再返回给客户端。

```
向Web Server发出HTTP GET请求。

收到服务器发回的数据:
{"id":100,"info":"Web Server发回的Json格式信息"}
```

测试查询字符串（客户端代码）

客户端发出包容查询字符串的HTTP请求

```
static async Task TestSearch()
{

    var client = getHttpClient();

    Console.WriteLine("HttpClient访问Web API服务器，通过查询字符串搜索数据。\n");

    string searchWhat = "中国人 abc";
    string searchUrl = $"api/myservice/search?value={searchWhat}";

    string result = await client.GetStringAsync(searchUrl);

    Console.WriteLine($"已经将“{searchUrl}”发给服务器……");

    Console.WriteLine($"\n收到服务器发回的数据:{result}");
}
```

测试查询字符串（服务端代码）

```
[HttpGet]
[Route("[action]")]
0 references
public IActionResult Search(string value)
{
    return Json(new
    {
        message = "Web API Server：您尝试着搜索“"+ value + "”"
    });
}
```

服务端参数value值，从URL中的查询字符串中按名字提取

```
HttpClient访问Web API服务器，通过查询字符串搜索数据。

已经将“api/myservice/search?value=中国人 abc”发给服务器……

收到服务器发回的数据:{"message":"Web API Server: 您尝试着搜索“中国人 abc”"}
```

添加定义HTTP Header

```
static async void TestHttpHeader()
{
    Console.WriteLine("测试向HTTP请求中添加自定义的Header。");
    var client = getHttpClient();
    client.DefaultRequestHeaders.Add("my-header", "my-header value");
    Console.WriteLine("Server端返回：");
    string result = await client.GetStringAsync("api/myservice/headers");
    Console.WriteLine(result);
}
```

```
[HttpGet]
[Route("headers")]
0 references
public IActionResult ShowHeaders()
{
    return Ok(Request.Headers);
}
```

客户端使用HttpClient向Web Server发送请求，添加了一个名为“my-header”的自定义HTTP Header。

Server端可以通过Request对象的Headers属性，提取出所有HTTP Header值。

```
Server端返回:
{"connection":["Keep-Alive"],"accept":["application/json"],"host":["localhost:12623"],
"my-header":["my-header value"],"mS-ASPNETCORE-TOKEN":["2ce4514d-007e-49ad-ba2b-e13d11
2e0964"],"x-Original-Proto":["http"],"x-Original-For":["127.0.0.1:60834"]}
```

客户端向服务端Post数据

```
static async Task TestPost()
{
    var client = getHttpClient();

    Console.WriteLine("向服务器Post一个MyClass对象。\n");

    var data = new MyClass()
    {
        Id = new Random().Next(),
        Info = "新对象创建于" + DateTime.Now.ToShortTimeString()
    };

    try
    {
        var response = await client.PostAsJsonAsync("api/myService", data);
        response.EnsureSuccessStatusCode();
        Console.WriteLine("服务器返回处理结果");
        var result = await response.Content.ReadAsStringAsync();
        Console.WriteLine(result);
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}
```

HttpClient组件提供了现成的方法将一个对象序列化为Json再发送给Server

服务端接收Post上来的信息

```
[HttpPost]
0 references
public IActionResult Post([FromBody]MyClass obj)
{
    return Ok(obj);
}
```

注意服务端的参数，需要添加[FromBody]，指明从HTTP请求的Body中提取数据并实例化。

```
敲任意键进行下一个演示:

向服务器Post一个MyClass对象。

服务器返回处理结果
{"message":"收到了你发送过来的MyClass对象","receivedObj":{"id":261249435,"info":"新对象创建于14:43"}}
```