

USING CLOUD COMPUTING CAPABILITIES  
ON THE EXAMPLE OF IMPLEMENTING A NEWS APPLICATION-FUNCTION

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*The possibilities of cloud computing technologies are considered on the example of the application implementation, which is a function that receives a news feed through the NewsApi service. The cloud computing model FaaS (Function as a Service), the Microsoft Azure cloud platform and the Azure Functions solution are used for implementation.*

Cloud computing technologies represent computing services such as databases, servers, network equipment, software, and many others provided via the Internet. The implementation of various tasks on low-power computers is inefficient due to the low processor performance, lack of memory, as well as the low speed of data transmission and exchange with external devices. Users can use the large number of readily available computing resources provided by cloud computing services instead of investing in hardware upgrades and new software, which are not used at full capacity to store and process information and to provide information technology services. The user gets the necessary resources through his computer in accordance with their needs.

Today, there are various cloud computing models. The main ones are IaaS (Infrastructure as a Service), PaaS (Platform as a Service), SaaS (Software as a Service). To select the optimal service, it is necessary to determine what work will be performed by the user, and what is given for maintenance. SaaS model allows you to work with ready-made programs via the Internet. The IaaS model allows the user to use virtual servers, data warehouses, operating systems and network resources as a connected service. Using the PaaS model, the user has the opportunity to rent a computing platform, «assembling» a computer of the required power and installing applications on it, as well as connect advanced artificial intelligence services, analyzing large amounts of information from Google, Microsoft, Oracle.

The advantages of using cloud computing technologies consider the example of a news web application implementation that will request information on certain criteria (keyword, category, country) with the ability to use a range of dates and receive news feed through NewsApi [“https://newsapi.org”].

To implement this task, a cloudless model of serverless computing was chosen, also called FaaS (Function as a Service). Functions as a Service (FaaS) are one of the new services offered by cloud service providers. The qualitative difference between FaaS and PaaS lies in the fact that the subject of the service is not some kind of monolithic complete web application, but a loosely coupled cloud-based system of components that allows you to create architectures whose work is subject to events [1]. Prior to FaaS, the Application was the smallest unit of scale. PaaS providers will allow developers to scale their applications by deploying multiple instances of their application. With the introduction of FaaS, developers can break their application down into functions and scale each function independently. There is nothing smaller than a function. A function takes a set of inputs and may return a set of outputs. It is possible to abstract a complex set of functions into simpler functions [2].

There are different providers of cloud platforms such as: Amazon web services, Google Cloud Platform, Microsoft Azure, IBM Open Whisk. Microsoft Azure provides the ability to subscribe to Azure for Students Starter. The offer is an ideal solution for students who want to get acquainted with cloud technologies. Therefore, the news web application, which is a function, will be implemented using the Microsoft Azure cloud platform and the Azure Functions solution. Azure features are a way to quickly launch code snippets in the cloud. To implement the function, the Visual Studio 2017 development environment and the C # programming language were chosen. It should be noted that Azure Functions provides the ability to write program code in other programming languages such as F #, Node.js, JavaScript.

The implementation of class with logic includes sending a request to the API (application programming interfaces) with parameters and getting a list of news. The implementation of the method of obtaining a list of news is presented in the listing below.

```
public static string GetNews(string query)
{
    var newsApiClient = new NewsApiClient(ApiKey);
```

```

var articlesResponse = newsApiClient.GetEverything(new EverythingRequest
{
    Q = query,
    SortBy = SortBys.Popularity,
    Language = Languages.EN,
    From = new DateTime(2018, 1, 25)
});
string html = @"<html>
    <head>
        <title>News API Example</title>
    </head>
    <body>";
if (articlesResponse.Status == Statuses.Ok)
{
    foreach (var article in articlesResponse.Articles)
    {
        html += $"<h4>{article.Title}</h4>";
        html += $"<p>{article.Author}</p>";
        html += $"<p>{article.Description}</p>";
        html += $"<a href=\"{article.Url}\">Learn more</a>";
    }
}
html += "</body></html>";
return html;
}
    
```

The implementation of the function that will return the list of news according to the specified criteria is presented in the listing below.

```

public static class Function1
{
    [FunctionName("News")]
    public static HttpResponseMessage Run([HttpTrigger(AuthorizationLevel.Anonymous, "get", "post",
Route = null)]HttpRequest req, TraceWriter log)
    {
        log.Info("News API HTTP trigger function processed a request.");
        string q = req.Query["q"];
        if (q != null)
        {
            string html = Util.GetNews(q);
            return Util.GetOKResponce(html);
        }
        else
            return Util.GetBadResponce();
    }
}
    
```

The result of testing this function is shown in fig.1.

```

C:\Program Files\dotnet\dotnet.exe
standard2.0
Now listening on: http://localhost:7071
Application started. Press Ctrl+C to shut down.
[26.04.2018 17:27:14] Reading host configuration file 'C:\Users\oleg5\OneDrive\Документы\Visual Studio 2017\Projects\Fun
ctionApp1\FunctionApp1\bin\Debug\netstandard2.0\host.json'
[26.04.2018 17:27:14] Host configuration file read:
[26.04.2018 17:27:14] {}
[26.04.2018 17:27:14] Starting Host (HostId=desktopriapj8f-581445342, InstanceId=fb79a463-ce16-4b7a-b449-466e7b89f3bd, V
ersion=2.0.11651.0, ProcessId=10244, AppDomainId=1, Debug=False, ConsecutiveErrors=0, StartupCount=1, FunctionsExtension
Version=)
[26.04.2018 17:27:15] Unable to configure java worker. Could not find JAVA_HOME app setting.
[26.04.2018 17:27:15]
[26.04.2018 17:27:15] Could not configure language worker Java.
[26.04.2018 17:27:15]
[26.04.2018 17:27:16] Generating 1 job function(s)
[26.04.2018 17:27:16] Found the following functions:
[26.04.2018 17:27:16] FunctionApp1.Function1.Run
[26.04.2018 17:27:16]
[26.04.2018 17:27:16] Host initialized (1414ms)
Listening on http://localhost:7071/
Hit CTRL-C to exit...

Http Functions:

    News: http://localhost:7071/api/News

[26.04.2018 17:27:17] Host started (2532ms)
[26.04.2018 17:27:17] Job host started
[26.04.2018 17:27:17] Host lock lease acquired by instance ID '000000000000000000000000EC84AB2'.
    
```

Figure 1. – Test result

The result of the Get request with the Apple parameter at http://localhost:7071/api/News and the result-  
 ing list of news are presented in fig. 2.

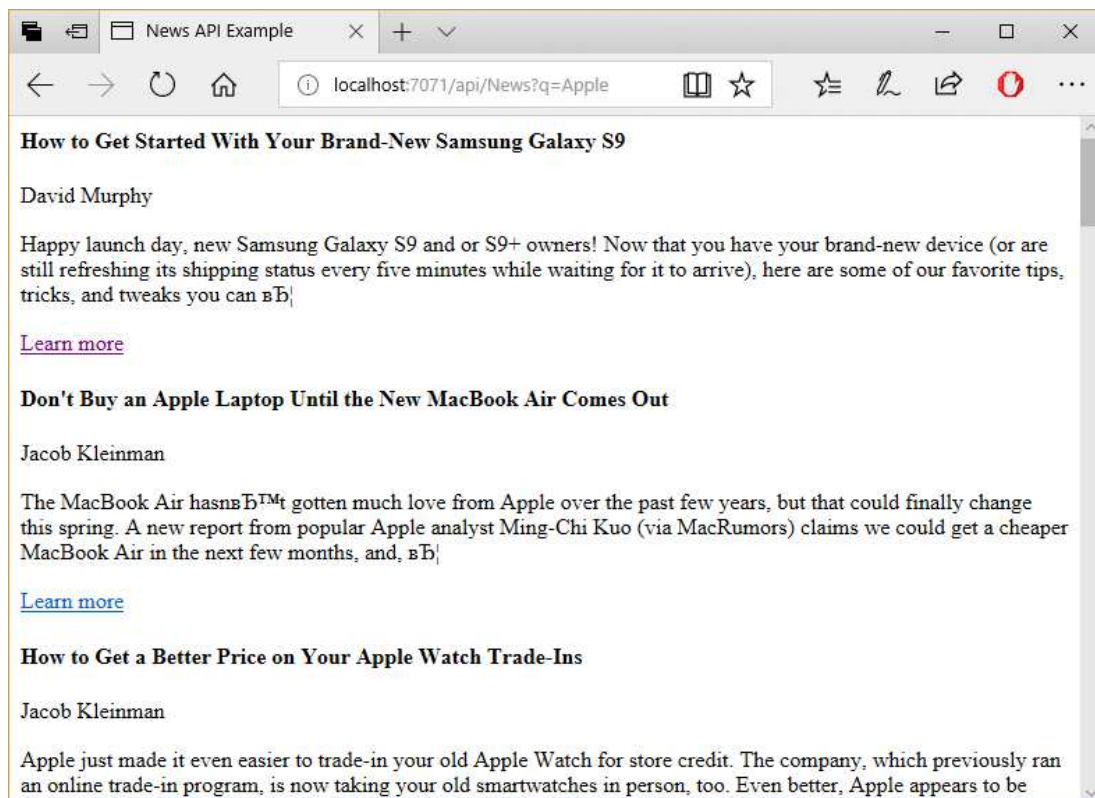


Figure 2. – Result of the news application-function

As a result of the cloud computing technologies use, the time spent on developing application functions  
 has decreased, since the use of serverless architecture has allowed us to abstract away from setting up and  
 managing the server, focusing solely on writing code. Servers are managed by cloud service providers through

automated systems. Updating an application-function is a simple task, as it is carried out through a web portal with the possibility of publishing «in one click». The system is not limited in terms of scaling; resources are allocated and released as needed. The exploitation of provider resources is terminated when the application is not running.

#### REFERENCES

1. Компьютинг без серверов [Электронный ресурс]. – Режим доступа: [http://www.tadviser.ru/index.php/Статья:FaaS\\_\(Function\\_as\\_a\\_Service\)](http://www.tadviser.ru/index.php/Статья:FaaS_(Function_as_a_Service)). – Дата доступа: 18.01.2019
2. Abstracting the Back-end with FaaS [Electronic resource]. – Mode of access: <https://serverless.zone/abstracting-the-back-end-with-faas-e5e80e837362>. – Date of access: 25.01.2019