Universal Ticket Generation Service for Events

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***Abstract*—This report based on a universal ticket booking website developed by using C#.NET and deployed on the Azure cloud platform. This report is a combination of Client Application, WebAPI, 2nd party API and 3rd party API. This system helps to generate a ticket and send it to the user by mail. Also, this report includes detailed system architecture and API implementation with some previous research on object storage and messaging platforms on cloud.**

***Index Terms*—ticket booking website, Azure, WebAPI, object storage and messaging**

I. Introduction

Application Program Interface (API) is a set of subroutines definitions, protocols, and tools for building software. WebAPI is an API over the internet which can be accessed through the HTTP protocol. WebAPI is a concept which we can build using different programming languages such as .NET, Java, etc. ASP.NET is an excellent platform for building RESTful services. It is having build in support for JSON or XML formats. It also uses machine-based interaction such as SOAP and REST. These APIs accepts URL encoded inputs and giving data in XML or JSON format. Mostly, SOAP-based APIs using XML validation for message integrity. WebAPIs are a secure tunnel to access data from server application by using GET(response) and POST(request) methods. Some APIs are secured by OAuth which is the security policy for APIs.

Ticket is the identity whether a person has a permit to attend an event or not. Ticket generation system is the web service which helps to generate a ticket. In this technology world, people are being used to with technology and contributing their life to the digital world. So, it is a need to be updated with technology. In earlier days, people had to go for ticket booking on event place. Now, this system is working digitally. If anybody wants a ticket in advance, then that person can book their ticket from anywhere by using technology. And this ticket is in digital format as well, people dont need to carry page or hardcopy always, they can use their phone to recognize their ticket on events place.

Here, the system is developed for those who want to book a ticket for upcoming events present in the city. People can search for events in the city by using specific date or time. Even they can search for events such as technology, movies, concerts, and sports.

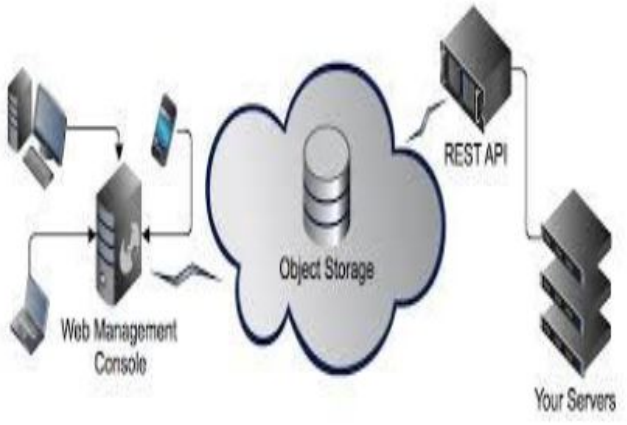

Fig. 1. Architecture of RESTful API [4]

After searching for events, by giving personal details and payment information, anybody can book their ticket by using this website. This client application is platform whether a user will get all type of event information with ticket booking service.

Second party API used for taking information regarding concert, movies and sport type events in the city. By using these APIs our client application get information regarding events. A user has to give input as city and date/time when they want to search event. After giving those inputs, APIs sending results to the client application and furthermore client application shows those events with ticket booking service.

Third party API is generating QR code which contains unique ticket number and helps to identify ticket details. Specially developed for those who want a ticket for their event. Basically, this API is taking inputs from the user application and using these inputs it is generating a unique code as ticket number which helps to identify a user on the spot.

Further sections arrange as follows: Literature review contains some background research on object storage and messaging infrastructures in the cloud; then solution architecture contains basic flow of my application; implementation will give

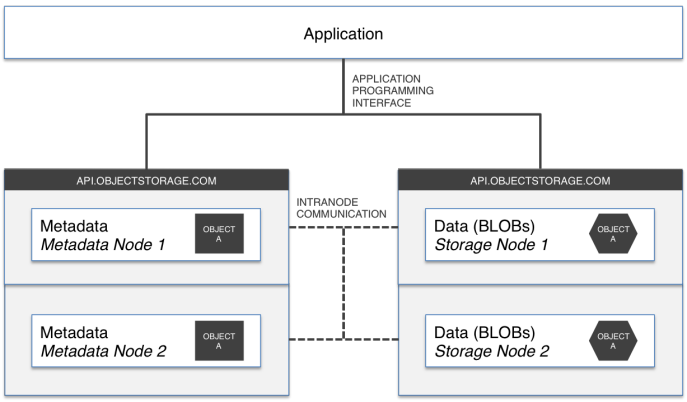

Fig. 2. Architecture of object storage

detail information about tools used for implementation;testing contains information about tool used to test API;conclusion will conclude this report and some references at last.

II. Literature Review

According to IDC [8], the total amount of data is increasing day by day. From this big data environment, some data is structured or unstructured. In, unstructured data, it contains images of videos and documents, etc. This data rate creates a challenge on enterprise storage infrastructure hence they are moving from their existing SAN to object storage services such as S3, cloud storage, etc. It provides a RESTful service for storing and accessing the file which is easy as compared to the existing file system. These processes are highly available, cost-effective, easy for access and scalable.

In 1996, object storage was proposed at Gibsons Carnegie Mellon University lab with the process of abstraction of reads and writes over data on flexible containers. Data was stored in storage instead of using file or blocks. After that researcher did some innovations in object storage.

Object storage allows the user to identify and address data of the individual object rather than just file name or path. It adds a unique identifier in the across the entire system, to support larger namespace and to remove collisions. Object storage having great capabilities because of it explicitly separates the file metadata from the given data. It provides object-level, customizes and full functional metadata in order to: Centralize Management of Storage Capture user/application information for indexing Data management policies Independently using Caching and Indexing from data storage to optimize metadata storage.

Object storage System came to market after 2008. It lured by the unbelievable growth of the captive system in a web application such as Yahoo Mail. the They proved the scalability and capability of cloud storage in the real market.

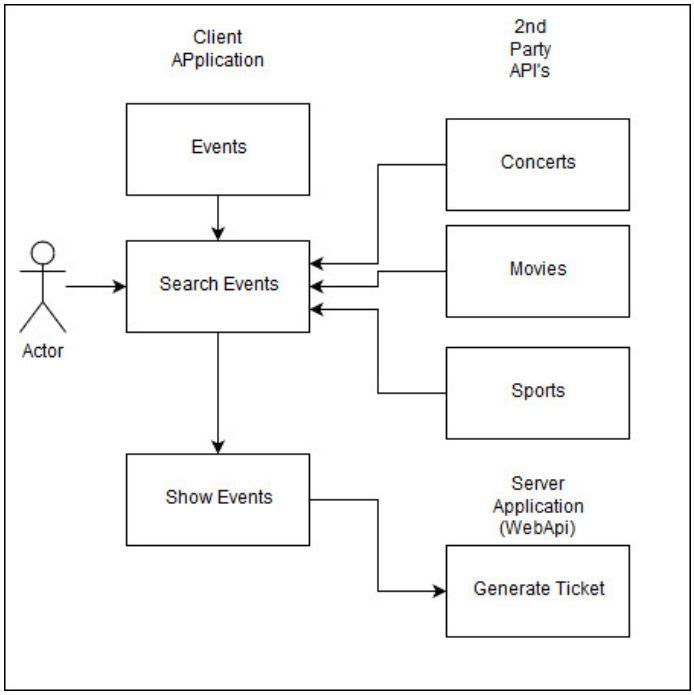

Fig. 3. Architecture of client application

In 2009, Haystack was managing 60B photos and 1.5PB of storage. It became famous as the much mobile application was choosing it as a common way to store binary data.

Today, a perfect object storage solution is Amazon S3, which helps to manage storage in one place with easy interface. This provides automatic tiering between different classes with an optimized cost by using object storage. Advantages of using object-oriented storage are durability scalability and availability present in the storage of data. Amazon offering flexible management for storage as well as proper security and compliance with their data. It benefits to take backup and recovery of data as well as in big data analytics, object storage plays a vital role in Amazon.

III. Solution Architecture

EventTracker is an application for getting detail information about concert, movie and sports events. It will help to search for upcoming events in the city. For that user has to pass input as city, date and some event details so that they will know exact information about events. For each type of event whether a concert, movies or sports; the user will get a separate page for each type. For the concert, a user will enter the city and date as input and they will get information about the concert in the city. Same for movies, just enter a movie name and they will get movie details. When user will enter input, 2nd party API will call and that inputs will convert into JSON and send it to the server and an API will send a reply in JSON objects as well.

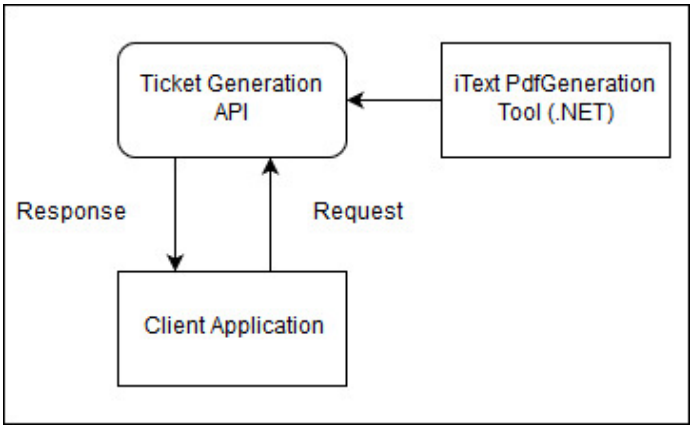

Fig. 4. Working of server application(API)

In my client application, those JSON outputs are converted into data and that should be displayed on the screen.

With these functionalities, my application contains server application which is ticket booking API. This API will help to generate a ticket for various events. A user has to give email ID and quantity for a ticket so that ticket will generate by using WebAPI. This API is taking inputs from the client application in JSON format and by using those values, it creates a Ticket which contains unique ticket number. And by using barcode generating API, it generates barcode of that ticket number. So that ticket will get unique identification. As a third-party application, I used Google Charts API for barcode generation. It contains a link with parameters of data and image dimensions for 2-D barcode image. These all values are arranging in a single file and ticket is generated. iText Sharp is a tool which I used to generate pdf by using these values. That pdf is downloaded on browser automatically so that user can print that ticket easily.And those details further save to my database so that in future if anybody needs to search ticket, they can easily search and get that ticket information.

IV. Implementation

- Client Application:
  - C#.NET [3]: C# is an object-oriented programming language which enables developers to create applications robust and secure that run on the .NET Framework. You can use C# to create various projects such as Web Applications, client-server application, WebAPI projects and many more. It is simple and easy to learn this programming language. Syntax of C# is easily recognizable to other object-oriented programming languages such as C, C++, and Java. A developer who knows any programming language can work with C# easily. Mostly, C# simplifies complexities present in C++ so it provides powerful features such as direct memory access, delegation, nullable value types and many more. Some of the features which are not present in Java, those features also you can get in C# such as direct memory access and lambda expressions.

    C# is having good performance and safety because it supports generic methods and types and iterators which enable collection classes to define custom iteration behavior. C# is supporting generic methods and types which provides better safety and performance for your application. Language-Integrated Query (LINQ) expressions make a query for excellent language construct. It also supports inheritance, encapsulation, and polymorphism like C, C++, etc. Applications entry point consists of main method as well as all variables and other methods are encapsulated in the class definition. The class inherits from one parent class and user override for avoiding accidental redefinition.

    C# enables generic methods and types which enables implementers of collection classes to define their behaviors so that is easy to handle by user code. In addition, some factors which will make your work easy to develop an application as follows:

    * Delegators, which are encapsulated method signatures enables type-safe event notification.
    * Private member variable properties which provide services as an accessor.
    * At run-time, Attributes provide declarative metadata.
    * Inline XML documentation.

    Visual Studio provides an advanced code editor, convenient user interface designers, integrated debugger, and many other tools to make it easier to develop applications based on the C# language and the .NET Framework.

  - iText Sharp: iTextSharp is a software development platform for generating pdf in coding. It is the primary way to integrate PDF functionalities in the application. In C#, developers need to add itextsharp.dll for accessing their functionalities. It contains various features like converting HTML to pdf, XML to pdf and many more.

    iText contains one core library named as iText Core Library which is common for every operation. Then pdfXFA and pdf2Data are another libraries which combine and create a document and writing that in pdf format. After the aggregation of data, we can convert that into the chart, table, etc formats. pdf-Calligraph, pdfInvoice, pdfSweep, pdfHTML these are external libraries which developer can use with iText.//

We can easily program data inside pdf. We can create a table or give some graphics functions in HTML and convert that HTML to pdf. So that generated data will be in a specific tabular format or structured format. pdfSweep is helping to remove sensitive data from pdf.

– Visual Studio [6]: Microsoft developed an Integrated Development Environment (IDE) for developing projects, software, web applications is the Visual Studio. Visual Studio is code editor which supports code refactoring and IntelliSense which helps to complete code component automatically so speed and accuracy will be increased. It works as machine-level and a source-level debugger. It also includes code-profiler which helps to build database schema as well as web and GUI designer classes.

  Visual Studio supports more than 36 programming languages from C# and C++ to Javascript and Python. It helps to way around your code so that you cant waste single context of code in IDE. Their improved GoTo feature filter down item easily so it will show whatever code you want to see. Inline object browsing present in solution explorer which shows object structure of your code. It also helps to solve bugs or error present in our code. It contains refactoring so that object names comes or modified automatically in quick action menu of Visual Studio Editor. The programmer can see the flow of code running while compiling.

  For this project, I used Web Application and Web API projects. Visual Studio has predefined MVC templates for these projects. We need to code as per our requirement and implement our application. For class, controller and aspx page, it has a separate template so if you require any file we just need to select a file type and whole structure we get in the visual studio. The server is automatically linked with this software so if we run this project, it runs on localhost in the browser. For authentication, it has an option for built-in authentication so that whether we can use personal, windows or other account authentication for our application or web API.

– Microsoft SQL Server: Microsoft developed SQL server which is database server with the primary function of storing and retrieving data as per user request or other applications. Then maybe that application will be on another server or same machine. MS SQL server has the following features:

  * Industry Landing Performance
  * User choice platform and language

```
{
  "CEmail": "cutomer1@email.com",
  "EName": "Ed-Sheeran Concert",
  "Edate": "19/09/2018",
  "Etime": "18:00",
  "Evenue": "Phoenix Park, Dublin",
  "Ttype": "ADULT",
  "Tquantity": "2",
  "Trate": "260"
}
```

Fig. 5. JSON Code for input

  * Least vulnerable database
  * Real-time intelligence
  * End to end mobile BI

  For this project, I used Microsoft SQL server management studio 17 for maintaining the ticket database. For storing information regarding events and ticket number. Whatever information API getting through client applications, It will generate ticket and details will store into database. So that it will be easy to recognize that ticket.

– JSON [5]: JSON(JavaScript Object Notation) is a simple data-interchange format. It is easy for developers to read and write. JSON is the easiest way to parse and generate data in machines. So, this application used JSON POST method to take input from the client application.

– Azure [7]: For deploying our code on a cloud platform, I used Microsoft Azure cloud platform. Azure is service for testing, deploying and managing the application on cloud. Characteristics of azure are productive, hybrid, intelligent and trusted.

  For this project, I published WebAPI and client application on Azure. WebAPI service from Azure is secured and easy to access. From the visual studio, we can easily publish our code on Azure on a single click. Azure provides faster instances and servers, so our application easily runs on a cloud platform faster. For database connection, I synchronized my SQL server with Azure so whenever API needs a database, it will save that value in the database, on the cloud platform then it will automatically reflect in machines database.

• API:
  – TicketGenerationAPI: TicketGenerationAPI is my server application for generating tickets for various

events. This is accepting inputs by POST request in JSON format. Then those inputs are converted into values and for each request, a unique ticker number is generating. By using these all inputs, I generated that values in HTML tags and converted into PDF by using iText Sharp library present in C#.NET. After generating this PDF, it is automatically downloading into users browser. In future, Im thinking to add email service in this API so that after generating a ticket, it will be mail to the user directly. I used this API in my own application to generate tickets for events. Anybody, who wants tickets for their application, they can use this API to generate a ticket.

- Movie: MovieAPI is 2nd party API which used in this project. For getting upcoming movies details, movie API is created. By using POST, the request will send from the client application to MovieAPI, and the application will get movies details by JSON format. That JSON outputs are converted into List and then it is showing that details on movie events page. This API is hosted on the Azure platform and by using HttpRequest, the application can get request.

- Concert: ConcertAPI is another 2nd party API used in this project. This API is giving upcoming concerts details to this application. Our application is sending inputs to ConcertAPI such as Place and Date by using a POST request. After getting this request, this API is fetching data from their database and showing concert details as output. All inputs and outputs are in JSON format, so while sending these inputs, first we have to convert that inputs in JSON and sending to API by using HttpRequest and after getting output, application converting that outputs in the list and showing that on the view page.

- Sports: SportsAPI is used for getting sport related events present in the city. This API used as 2nd party API in this project. This API is based on a GET response. When a user will click on search for a sports event in my application, get should be called and by using GET, all upcoming sports events can be retrieved by using API. This details will be in JSON so we need to convert that into the list to show that details to the user.

- QR Code Generation(3rd Party API): This is third party API used for generating QR code for tickets. Server Application sending ticket number by GET request for QR code. API is giving QR code as output. This output contains a two-dimensional barcode. The syntax for this API is https://chart.googleapis.com/chart? And attributes are based on the client application. The client application is passing ticket number and dimensions for QR code image.

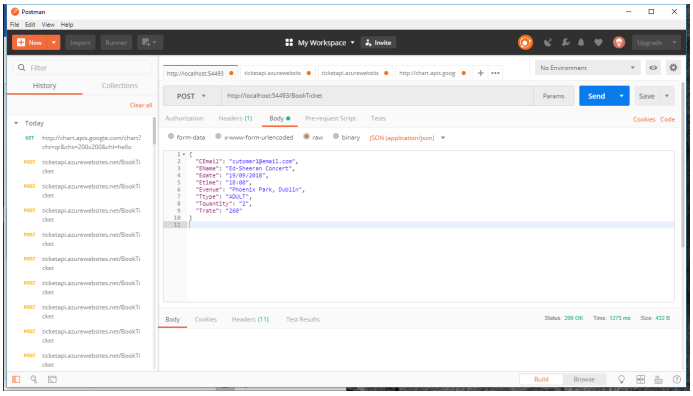

Fig. 6. Postman: API Testing Tool

A. *Testing*

API testing involves end-to-end transactions during request and response. API test is important to identify whether it is taking correct inputs or giving a correct response or not. Here, I used Postman for testing our API to check whether it is taking correct post request or not.

- Postman: In postman, we have to insert the link of WebAPI with POST request type. Also, we need to give some inputs by selecting raw input and JSON format in postman. After clicking send, it requests our API by POST request and receiving output as true if it is running correctly. Also, it is showing a prompt whether you have to select download path so that ticket is generating in pdf. Postman shows output in XML format but here API contains code which is showing true as a positive response.

V. Conclusion

In this way, we implemented a client and server application using C#.NET and deployed on Azure cloud platform with SQL server as a database. We used 2nd party and 3rd party API for increasing features for client application. We have successfully implemented RESTful application API by using GET and POST methods.

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