

# ANTIK Web Framework

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**Abstract:** *ANTIK stands for Advanced Network Testing Framework and packet Injection Toolkit. This tool was designed and developed to be a lightweight, powerful testing framework which allows the users to customize and modify according to their requirements and is deployed in testing the performance of the network. However this tool is not very user-friendly and scalable. The ANTIK WEB FRAMEWORK aims to overcome these drawbacks. Web frameworks can take an application from merely a process on a local computer to a globally deployed tool. The ANTIK Web framework aims to do the same. The ANTIK application only runs on the server in which it is installed, without this. But with the development of this framework, the ANTIK application can be triggered from anywhere on the network. This paper aims to survey the existing methodologies and pit them against each other to choose the best one. Web frameworks for python have been surveyed to select a suitable one for medium scale applications. Design architectures have been studied carefully to understand their advantages and shortcomings. The many approaches to implementing IPC are mentioned along with the best one. For establishing a communication channel, different methodologies have been compared to highlight the tradeoff between complexity and performance. A comparison has also been made on the different version control systems and why it is required. Techniques for data serialization finally have been pitted against each other to bring out their pros and cons.*

**KEY WORDS:** Django, Protocol Buffers, Model View Controller, JSON,TCP,SVN,GIT

## 1. INTRODUCTION

Web applications are becoming increasingly popular because of their user-friendly and elegant structure. Due to the increasing popularity and advancement of the Web technology, many organizations wish to Web-enable their existing applications without having to modify existing host-based applications. Because, web frameworks not only give the existing applications a common, modern, user-friendly look and feel but also allow to deploy them on corporate public Internet, Intranets and newer Extranets. Similarly ANTIK web framework is designed to provide a clean, neat and a user friendly front end to the back end application ANTIK, a network testing framework that was designed as a network testing toolkit.

The major drawback of this application was its non-scalability and a poor user interface.

And the solution to this is the ANTIK web framework. This survey paper contains information and research about the various models, technologies and frameworks being used in developing web applications such as frameworks and servers.

## 2. LITERATURE AND TECHNOLOGY SURVEY

### 2.1.WEB FRAMEWORKS

Pyramid<sup>[8]</sup> is a web framework very agnate to Django. It is used in wide range of applications where the growth of the size of the applications is not known. To help with such cases, Pyramid offers support to small scale as well as large scale applications. Its drawback is that although it provides routing and other networking functions as built in functions, extra functionalities like templates and forms must be used by importing external libraries.<sup>[9]</sup>

Flask<sup>[10]</sup> is a python web framework used for relatively smaller applications that have only one or two functions. Its biggest advantage is that it is very lightweight. It is known as a “microframework” for python because of the kind of applications it supports. Although it provides routing and other networking functions as built in functions, additional functionalities like forms and templates must be used by importing external libraries. In contrast to Django, that provides very high degree of support in the form of built-in applications, Flask only includes the required basic minimal functionalities. Other services required must use external libraries.<sup>[11]</sup>

Django<sup>[6]</sup> is a high level web framework using python programming language. It is extremely easy to use since most of the work is done by the framework and minimal coding is required on the developer’s side. Like the saying “Do not try to reinvent the wheel”<sup>[7]</sup>,

Django helps us in saving the time required to type out code for common functionalities and helps you focus on your application design. It has a very user friendly and easy-to-use set of

templates and built in features for routing, forms, database administration, etc. This makes it very easy for people who know python to start coding in django easily.

## 2.2. DESIGN ARCHITECTURE

ASP.NET WebForms from ASP were first brought out by Microsoft. Web Forms allows to build dynamic websites using an event-driven model. There is no such predefined architectural approach for the development of a project using this. The ViewState, Postbacks and Controls seemed to be great solutions for ASP but caused a lot of problems like complex pages causing performance issues. Unit testing becomes almost impossible due to the tightly coupled architecture. These are few reasons why MVC is preferred over ASP.NET Web Forms.

Model View Controller or MVC, is a software design pattern useful for developing web applications. A Model View Controller pattern consists of the following three parts:

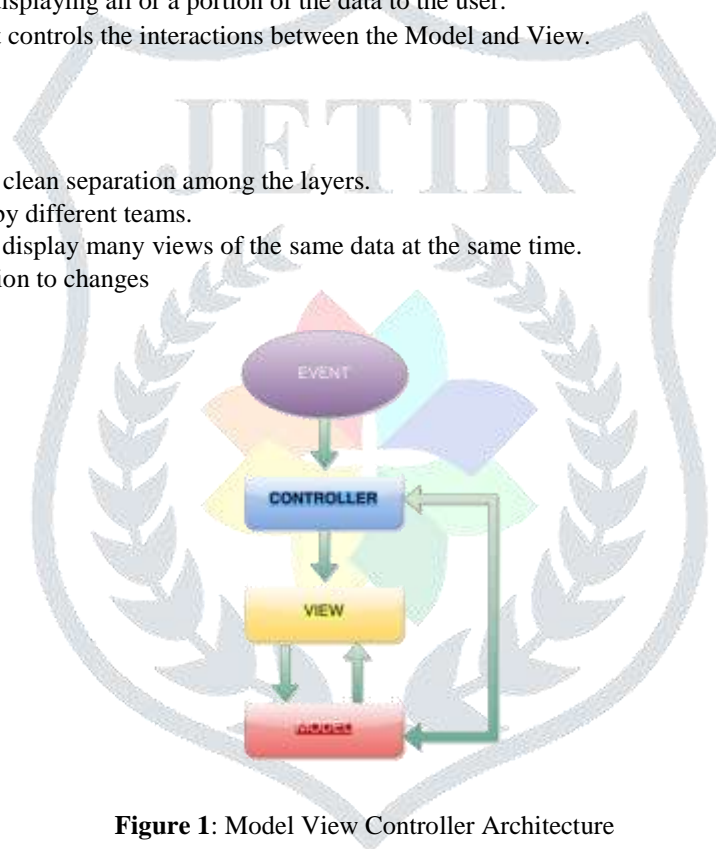
Model - The lowest level of the pattern which is responsible for maintaining data.

View - This is responsible for displaying all or a portion of the data to the user.

Controller - Software Code that controls the interactions between the Model and View.

*Advantages of MVC:*

- Provides isolation and clean separation among the layers.
- Parallel development by different teams.
- The user interface can display many views of the same data at the same time.
- Provides accommodation to changes



**Figure 1:** Model View Controller Architecture

## 2.3.COMMUNICATION CHANNEL

Transmission Control Protocol<sup>[2]</sup> is a connection oriented protocol which deals with end to end communications. Firstly connection has to be set up between the sender and the receiver and data is sent over the connection which is established. And it usually waits for the feedback before sending more details in a congested network. However, UDP is a very simple and connection less protocol, which does not follow any kind of end to end communication. Instead, it just sends the data in one direction without worrying about what is happening at the receiver's end.

**Reliability:** For reliability purpose TCP is comparatively better than UDP because TCP uses acknowledgement and it constantly checks to see if the data or packets are being delivered to the receiver or not. This is done by time out and retransmission process. But in UDP, the source just keeps transmitting data. So it can be said that TCP is better than UDP when reliability is considered.

**Ordered delivery:** In TCP the packets arrive in the same order in which they leave the sender. Even if they don't arrive in the same order, resequencing takes place and all the packets are put in order. Sequencing of packets is very easy in TCP since the packets

carry a header which contains information about the packet including its sequence number. On the other hand, UDP does not have any option for sequencing of packets and so they may be delivered out of order.

Data: In TCP data is read as a stream of bytes and the messages are transmitted in the form of segments. But in UDP, data is divided into datagrams, which is sent across the network.

Wired Scenario in UDP and TCP: <sup>[2]</sup> In UDP, there is continuous transmission at a particular node and the sent packets are continuously discarded. Hence, there is loss of packets in the case of failed transmission in UDP. In TCP however, a queue by queue mechanism is followed, meaning, a queue of packets is created which is sent across the nodes, and the difference being, the source in TCP sends the next packet only after getting the acknowledgements from previous queues. This helps in reduction of loss in packets at the transmission as well as flow level.

## 2.4. INTERPROCESS COMMUNICATION

Inter-process communication (IPC)<sup>[5]</sup> allows an application to handle many user invocations at the same time. It is a set of programming interfaces that allow a programmer to coordinate activities among different processes that can run simultaneously in an operating system. There are many approaches used for IPC. A file is a record that is stored in a disk which can be accessed by multiple processes. Files can be accessed sequentially. They can store data permanently and retrieved when needed. Processes can also communicate via signals, i.e. they send signals to each other to indicate certain operations. Data is usually not sent as signals, rather they are used by one process to command another process. A semaphore<sup>[5]</sup> is yet another approach to IPC.<sup>[10]</sup> It is mainly used for synchronization between different processes with regard to shared resources in the system or network. IPC can be implemented using shared memory concept too. In this, many processes use the same data buffer or data block in the memory. This way, the messages need not be actually sent via channels. Rather, the data to be shared with the other processes are just written into the shared block from where it can be read by all the processes sharing that memory block. A message queue allows for two processes to communicate anonymously, i.e. without directly connecting to each other. It is similar to a socket and is realized by the OS. In this type of system, the processes write to the message queue and this is then transmitted by the operating system to the required process. Hence this establishes indirect communication between two processes.

Message passing<sup>[3]</sup> is a very prominent type of IPC. It allows many programs to communicate with each other by passing messages via channels. A pipe is used for bidirectional communication between two processes by interfacing with standard input and standard output. It usually deals with only one character at a time. A socket is a stream of data that is usually sent through a network interface. The communication can either be between two processes residing in the same computer or processes on different computers. If the same computer contains both processes then a loopback address can be used as the IP address along with the port being an ephemeral port. If the processes are existing on different computers then the IP address of the other computer needs to be given along with the port number on the other computer that is used in the particular communication. Of the above mentioned methods, message passing is the traditional and most commonly used method for Inter-Process Communication.

## 2.5. VERSION CONTROL SYSTEM

SVC<sup>[12]</sup> is the management of changes to computer programs, large web sites, documents etc. Any changes if found are usually identified by a letter code or number, termed the "revision number", "revision level", or "revision". Advantages of source version control:

- Provides automatic backup as in if at all you automatically delete any files you can undelete it.
- Provides special feature of sharing files among multiple computers.
- Provides update facility by which any changes made gets saved.
- Provides a way in which multiple versions of same code can be viewed.
- Provides a feature by which one can experiment new features on the code without altering the existing code.
- Provides a way by which one can monitor how much of work is done by whom, where and when.

### 2.5.1 GIT over SVN

SVN or Subversion<sup>[12]</sup> is a type of source version control developed by Apache. It is a free software distributed over the Apache license. SVN is used by developers to maintain current and previous versions of software files.

GIT<sup>[12]</sup> is another type of source version control. It lets you maintain various versions of files like source codes or other documentation. The main advantage of GIT over other source control systems is that every GIT directory is a repository of different versions. Therefore one can operate on and commit different versions without access to the central server. This is a very big advantage to developers who sometimes maybe working in areas without internet connection. GIT lets you save your work in the local repository and it commits the changes to the central repository when network access is available.

The advantage of GIT over SVN is that GIT lets you maintain a local repository in every working directory whereas SVN needs access to the central server in order to commit the version. Therefore if a developer does not have internet connection at any point of time, and he is using SVN then he'd need to manually store the data on his computer using copy/paste. Whereas if he were using GIT then he can commit the changes to the version in the local repository and it automatically gets committed to the central repository when the internet connection is available.

## 2.6. DATA SERIALIZATION

Protocol Buffers<sup>[4]</sup> were developed by Google. They are platform-independent and language independent means to serialize structured data. They can be either used to store data or transmit data from one program to another. Although Protocol Buffers are more efficient than XML, in that they are faster and smaller, they are very less efficient compared to JSON. In fact, they are 17 times slower to write and 6 times slower to read than JSON files. And the disadvantage of JSON over Protocol Buffers namely, a larger file size can be easily overcome by compressing the JSON files. Therefore, Protocol Buffers are bulky and need C, C++ and python compilers and hence the better option is JSON.

JSON or JavaScript Object Notation<sup>[4]</sup> is a language independent data exchange format. It is in a human readable format. JSON is also lightweight and can be easily parsed by machines. Although it is language independent, it uses the formats of C, C++, Java and others. The two main structures of JSON are:

- A set of name/value pairs. This can be modelled using arrays, hash tables, structures or objects.
- A list of ordered values. This can be modelled as arrays, lists or vectors.

Since these are universal data structures that are supported by all languages, it is good to have a data format that also supports these structures. Since JSON is much simpler, lighter and faster than protocol buffers, it makes for the ideal choice.

## 3 CONCLUSION

This survey paper compares and evaluates various technologies in the world of web development. It is inferred that with respect to the framework being developed for antik, the following conclusions are drawn. Since Django is not a small scale framework like Flask and does not involve the overhead associated with Pyramid, it is ideal in developing the ANTIK Web Framework. After reviewing the design architecture of the past, namely ASP.NET WebForms, it has been found that the Model View Controller is the ideal architecture for designing latest Web applications. As already shown, TCP is more reliable and efficient than UDP at the cost of overhead associated due to the necessity to setup connection. If this can be accommodated then TCP can be utilized. Also, there are many approaches to Inter process Communication as reflected in the paper. Of the ones listed, message passing serves to be a simple and elegant technique to carry out IPC. Version Control Systems are used to store different versions of the application in a repository. For this purpose, GIT has been found to be better compared to SVN due to its local repository facility. Finally, to serialize structured data, protocol buffers and JSON are the two most popular techniques used. Since protocol buffers are bulky, JSON can be deployed to send the data in a lightweight manner. In this way, all the techniques and methods are weighed out to find the best possible solutions in developing this web framework.

## 4 ACKNOWLEDGEMENT

The work reported in this paper is supported by the college through the TECHNICAL EDUCATION QUALITY IMPROVEMENT PROGRAMME [TEQIP-II] of the MHRD, Government of India.

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