

# Thick Client Web Application Prototype

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Received: 1 June 2017 ▪ Revised: 5 August 2017 ▪ Accepted: 15 September 2017

**Abstract:** A thick client web application prototype is a web-application for presentation similar to that of an office application like Microsoft PowerPoint, Google Docs etc., The project introduces a framework that provides a prototype for developing modern web applications and helps in overcoming challenges involved and empower them with latest technologies like server push-pull, internet polling techniques.

**Keywords:** User Interface, CSS, SaaS, Background Level.

## INTRODUCTION

Page-centric Web development structures an application into individual scripts, each conscientious for processing a user request and producing a response. [1-7]Links pass control from one script to the next. This forces a go-to hardwiring of the control stream because each page must comprehend what comes next. [8-12]In spite of the software developers have long considered go-to statements destructive, they are still present in today's mainstream architecture, and they obstruct the recycle of pages in diverse parts mainstream of the application. Nowadays, numerous complex applications are fabricated with a web browser as their main client interface.

In this project we introduce, a web application system that gives a uniform and pure object-oriented perspective on web applications. We provide a prototype that could be referenced in future for creating advanced web applications.

## OBJECTIVE

This project aims at overcoming issues involved in developing modern web applications and additionally extends them with modern features. The project also intend at making the application to possess same look and feel as of a desktop application and empower them with cross platform compatibility across devices. [8-11]

This prototype is potentially capable of running in various platforms, as it is a traditional web application that just runs inside a browser sandboxed environment. Since all major browsers follow W3C web standards, the application performance and rendering is same across all platforms and devices. Additionally the application can switch between Thick Client and Thin Client architecture so that the end users can work either offline or online which means they are independent of network availability. When network is available the application can pull the users content from the server, otherwise can make use of local file system. In case of pushing data, the same methodology follows. It introduces an abstraction layer over the asynchronous interaction protocol between the client and server to provide the illusion of using desktop application. [10-11]

This prototype also overcomes the current web application development challenges which includes hot-debugging/compilation, object re-usage, etc., since the application follows web application standards and can run in server side, it is capable of serving as SaaS application in cloud environment.

## RELATED WORKS

Seaside is open source and in prolific use in many business-related applications

Seaside introduces a layer of abstraction over the non concurrent interaction protocol between the client and server to grant the illusion of developing a desktop application. This high level of deliberation is made possible by the reflective abilities of Smalltalk. The drawback of existing system as follows:

- Memory efficiency is a questionable factor
- Complete workload on individual client

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- Network capabilities and features are not considered into account
- Lack of SaaS capabilities and advanced network features.

### PROPOSED SYSTEM

The proposed design composed of a “background level” written in python running in a single thread and HTML for event handling and presenting a view to the user.

All the UI components are created and reused with the single page and memory optimization is done by pushing all unfocused (but used) components to a cache file.

Hot debugging and recompilation is being achieved by integrating the application with the browser add-on, which has options to debug both guy components as well as variables in the program.

Recompilation can be done on the fly without running the whole program after some modification.

Workload on individual system is being reduced with the availability of internet connectivity. The background python thread automatically detects the availability of network and connects to the server and hereafter uses the server resources and server space rather than eating client resources.

The Real-time sharing features allow multiple users to collaborate and run the application using a polling technique, where set of users subscribe to a single publisher and keep polling for new data and updates. The polling module keeps checking the publishers state through a central server and updating the changes on client side if there occurs a update on latter. Similarly in case of publisher the module keeps track of current publisher state to which all clients are subscribed to.

### OVERALL ARCHITECTURE

The basic architecture of our prototype is a three tier layer consists of presentation, processing and storage layers. The architecture consists of three layers,

**Top level presentation layer** written in CSS, java script and html which is responsible of displaying contents and also to receive inputs form the end user and record all events taking place at client side.

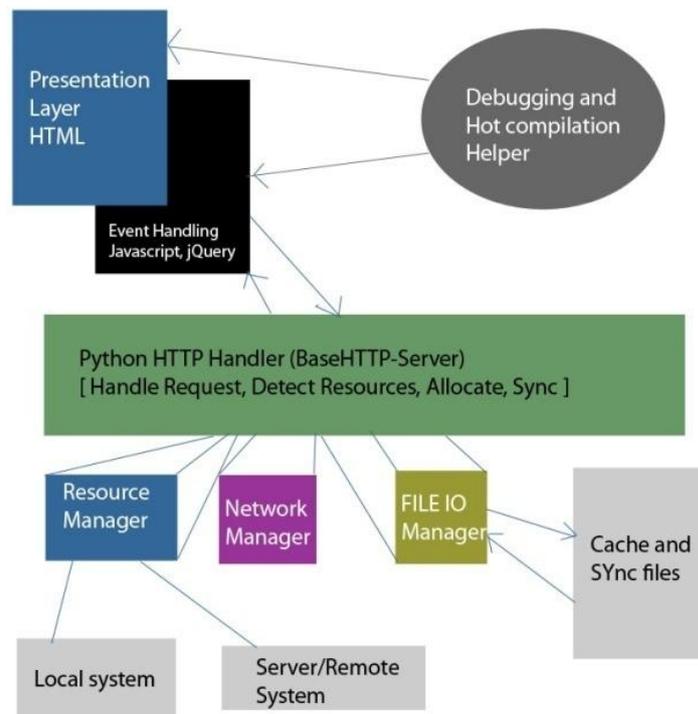


Fig. 1: Architecture Diagram

**Middle level processing layer** is a python http handler or a light weight python http server that takes responsible for processing HTTP get and post requests originating from the client side and taking the appropriate actions and responding the client with associated data/actions .this layer also takes care of resource detection and allocation, which plays vital role in reducing the workload on client. This layer is also responsible for publishing user events occurring at client side and also to subscribe to any hosts if available.

**Bottom level consists of a storage layer** which is primarily responsible for data storage and session state storage. The python layer decides whether the storage must be switched to local file system or remote file system based on availability of network resources.

**Objects prototype** everything in the system is considered to be objects. Every objects such as image, video etc., possess of various attributes like uniqueid, dimensions, appearance properties and is linked with events like click, mouse-over, mouse-out etc..

#### **Event Management Module**

This module is used to handle user events and inputs. Since end-users interact with the system through graphical user interface and these actions must be recorded and has to be sent to processing layer for processing.

In addition to that, performing asynchronous communication with background layer (Python thread) is also being carried out by this module.

#### **Local File-IO Management Module**

IO management module is responsible for saving and loading data to and from the local file system and performs reading and writing operations and maintains cache files and validates them with timestamp and last modified time.

Since the memory efficiency is improved by maintaining cache files this module decides how much data has to be cached and other attributes of cache files.

#### **Background Python Thread: http Handler**

This module is basically a python background thread used to process all inputs originating from the front-end and to provide response to the top presentation layer. In addition to processing user events it has to take care of other tasks too. It contains following sub modules.

#### **Caching Modules**

Its primary responsibility is to cache reusable objects. When an object is being reused again and again it is being cached so as to achieve memory efficiency and fast access. When the application is closed, the state of working files and application is also saved into the cache file for later access.

#### **Resource Detection Modules**

To detect various resources available in local file system and if network is available, detect resources available in the remote environment.

Unless the external resource is available this module makes arrangements to use the current local system resources and storage features, but as soon as network availability is sensed the resources available in network is being listed and the control is transferred to the server filesystem and thus reducing the workload on client.

#### **Network Resource Management Module**

##### **1) Polling Module**

Real time sharing feature is implemented using polling module, which is used to broadcast states of users across all listening clients. The publisher constantly publishes his state and the subscribers who all subscribed to the publishers content keeps polling the change of state or actions performed by the publisher and the polling module implements this functionality. Precisely at subscriber side the module is responsible to periodically check the subscriber state and at the publisher side to update and broadcast the change of state to all subscribers otherwise called listeners.

##### **2) Server-runtime Module**

Server runtime modules processes all requests from client with server runtime and allocates server resources like memory, disk space etc., so that client resource usage is minimized.

Thus an overview of modules that makes up the whole system is explained. Each module and their respective functionalities are explained. The system is mainly composed of four major modules and various sub-modules under every module.

### **CONCLUSION**

Thus prototype successfully helps to solve challenges involved in developing modern web applications and also extend them with latest technologies and trending web features.

Our project will act as a blueprint for building high performance future web applications that could someday replace the traditional desktop applications completely.

Compared to the advantages of our prototype, there are few disadvantages too. The prototype is designed and optimized by keeping in mind with the modern computing power and architecture and hence the performance measures could be applied to modern computing speed and memory. With older browsers and low computing resources the prototype will experience a performance hit.

## REFERENCES

- [1] Das, J., Das, M. P., & Velusamy, P. (2013). Sesbania grandiflora leaf extract mediated green synthesis of antibacterial silver nanoparticles against selected human pathogens. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 104, 265-270.
- [2] Umanath, K.P.S.S.K., Palanikumar, K., & Selvamani, S. T. (2013). Analysis of dry sliding wear behaviour of Al6061/SiC/Al2O3 hybrid metal matrix composites. *Composites Part B: Engineering*, 53, 159-168.
- [3] Udayakumar, R., Khanaa, V., Saravanan, T., & Saritha, G. (1786). Cross layer optimization for wireless network (WIMAX). *Middle-East Journal of Scientific Research*, 16(12), 1786-1789.
- [4] Kumaravel, A., & Rangarajan, K. (2013). Algorithm for automaton specification for exploring dynamic labyrinths. *Indian Journal of Science and Technology*, 6(5S), 4554-4559.
- [5] Pieger, S., Salman, A., & Bidra, A.S. (2014). Clinical outcomes of lithium disilicate single crowns and partial fixed dental prostheses: a systematic review. *The Journal of prosthetic dentistry*, 112(1), 22-30.
- [6] Vijayaraghavan, K., Nalini, S.K., Prakash, N.U., & Madhankumar, D. (2012). One step green synthesis of silver nano/microparticles using extracts of Trachyspermum ammi and Papaver somniferum. *Colloids and Surfaces B: Biointerfaces*, 94, 114-117.
- [7] Khanaa, V., Mohanta, K., & Satheesh, B. (2013). Comparative study of uwb communications over fiber using direct and external modulations. *Indian Journal of Science and Technology*, 6(6), 4845-4847.
- [8] Khanaa, V., Thooyamani, K. P., & Udayakumar, R. (1798). Cognitive radio based network for ISM band real time embedded system. *Middle-East Journal of Scientific Research*, 16(12), 1798-1800.
- [9] Vijayaraghavan, K., Nalini, S.K., Prakash, N.U., & Madhankumar, D. (2012). Biomimetic synthesis of silver nanoparticles by aqueous extract of Syzygium aromaticum. *Materials Letters*, 75, 33-35.
- [10] Caroline, M.L., Sankar, R., Indirani, R.M., & Vasudevan, S. (2009). Growth, optical, thermal and dielectric studies of an amino acid organic nonlinear optical material: l-Alanine. *Materials Chemistry and Physics*, 114(1), 490-494.
- [11] Kumaravel, A., & Pradeepa, R. (2013). Efficient molecule reduction for drug design by intelligent search methods. *International Journal of Pharma and Bio Sciences*, 4(2), B1023-B1029.
- [12] Kaviyarasu, K., Manikandan, E., Kennedy, J., Jayachandran, M., Ladchumananandasiivam, R., De Gomes, U. U., & Maaza, M. (2016). Synthesis and characterization studies of NiO nanorods for enhancing solar cell efficiency using photon upconversion materials. *Ceramics International*, 42(7), 8385-8394.
- [13] Sengottuvel, P., Satishkumar, S., & Dinakaran, D. (2013). Optimization of multiple characteristics of EDM parameters based on desirability approach and fuzzy modeling. *Procedia Engineering*, 64, 1069-1078.
- [14] Tandel, J. N. (2017). Development and validation of RP-Hplc method for the Simultaneous Determination of amiloride hydro chloride and Furosemide in pure and pharmaceutical Dosage form. *Eurasian Journal of Analytical Chemistry*, 12(4), 385\_394.
- [15] Yusof, N. F., Sharib, J., & Jaffary, N. A. M. (2017). Determination of 238Pu and 239 in Marine Sediment Using Alpha Spectrometry. *Eurasian Journal of Analytical Chemistry*, 12(4), 405-416.
- [16] Kavitha, J., & Lakshmi, K. S. (2017). Design of Experiments Based Validated HPTLC Method for Quantification of Oxybenzone and Avobenzone in Personal Care Products. *Eurasian Journal of Analytical Chemistry*, 12(4), 417-428.
- [17] Chellaram, C. (2009). Bioactive potential of coral associated gastropod, Trochus tentorium of Gulf of Mannar, Southeastern India. *J. Med. Sci*, 9(5), 240-244.

- [18] Kaviyarasu, K., Ayeshamariam, A., Manikandan, E., Kennedy, J., Ladchumananandasivam, R., Gomes, U. U., & Maaza, M. (2016). Solution processing of CuSe quantum dots: Photocatalytic activity under RhB for UV and visible-light solar irradiation. *Materials Science and Engineering: B*, 210, 1-9.
- [19] Kumaravel, A., & Udayakumar, R. (2013). Web portal visits patterns predicted by intuitionistic fuzzy approach. *Indian Journal of Science and Technology*, 6(5S), 4549-4553.
- [20] Srinivasan, V., & Saravanan, T. (2013). Reformation and market design of power sector. *Middle-East Journal of Scientific Research*, 16(12), 1763-1767.
- [21] Kaviyarasu, K., Manikandan, E., Kennedy, J., & Maaza, M. (2015). A comparative study on the morphological features of highly ordered MgO: AgO nanocube arrays prepared via a hydrothermal method. *RSC Advances*, 5(100), 82421-82428.
- [22] Kumaravel, A., & Udhayakumarapandian, D. (2013). Construction of meta classifiers for apple scab infections. *International Journal of Pharma and Bio Sciences*, 4(4), B1207-B1213.
- [23] Sankari, S. L., Masthan, K. M. K., Babu, N. A., Bhattacharjee, T., & Elumalai, M. (2012). Apoptosis in cancer-an update. *Asian Pacific journal of cancer prevention*, 13(10), 4873-4878.
- [24] Harish, B. N., & Menezes, G. A. (2011). Antimicrobial resistance in typhoidal salmonellae. *Indian journal of medical microbiology*, 29(3), 223-229.
- [25] Manikandan, A., Manikandan, E., Meenatchi, B., Vadivel, S., Jaganathan, S. K., Ladchumananandasivam, R., & Aanand, J. S. (2017). Rare earth element (REE) lanthanum doped zinc oxide (La: ZnO) nanomaterials: synthesis structural optical and antibacterial studies. *Journal of Alloys and Compounds*, 723, 1155-1161.
- [26] Caroline, M. L., & Vasudevan, S. (2008). Growth and characterization of an organic nonlinear optical material: L-alanine alaninium nitrate. *Materials Letters*, 62(15), 2245-2248.
- [27] Saravanan T., Srinivasan V., Udayakumar R. (2013). A approach for visualization of atherosclerosis in coronary artery, Middle - East Journal of Scientific Research, 18(12), 1713-1717.
- [28] Poongothai, S., Ilavarasan, R., & Karrunakaran, C.M. (2010). Simultaneous and accurate determination of vitamins B1, B6, B12 and alpha-lipoic acid in multivitamin capsule by reverse-phase high performance liquid chromatographic method. *International Journal of Pharmacy and Pharmaceutical Sciences*, 2(4), 133-139.
- [29] Udayakumar, R., Khanaa, V., & Saravanan, T. (2013). Synthesis and structural characterization of thin films of SnO<sub>2</sub> prepared by spray pyrolysis technique. *Indian Journal of Science and Technology*, 6(6), 4754-4757.
- [30] Anbazhagan, R., Satheesh, B., & Gopalakrishnan, K. (2013). Mathematical modeling and simulation of modern cars in the role of stability analysis. *Indian Journal of Science and Technology*, 6(5S), 4633-4641.
- [31] Shirkhedkar, A. A., Chaudhari, S. R., Patil, A. S., & Surana, S. J. (2017). A Concise Review on Analytical Profile of Valsartan. *Eurasian Journal of Analytical Chemistry*, 12(4), 337-364.
- [32] Attia, K. A. S., Mohamad, A. A. H., & Emara, M. S. (2017). Determination of albendazole in the presence of its alkaline degradation product using TLC-densitometric and chemometric methods: A comparative study. *Eurasian Journal of Analytical Chemistry*, 12(4), 365-383.
- [33] Caroline, M.L., & Vasudevan, S. (2009). Growth and characterization of bis thiourea cadmium iodide: A semiorganic single crystal. *Materials Chemistry and Physics*, 113(2-3), 670-674.
- [34] Sharmila, S., Jeyanthi Rebecca, L., & Das, M. P. (2012). Production of Biodiesel from Chaetomorpha antennina and Gracilaria corticata. *Journal of Chemical and Pharmaceutical Research*, 4(11), 4870-4874.
- [35] Thooyamani, K.P., Khanaa, V., & Udayakumar, R. (2013). An integrated agent system for e-mail coordination using jade. *Indian Journal of Science and Technology*, 6(6), 4758-4761.
- [36] Caroline, M. L., Kandasamy, A., Mohan, R., & Vasudevan, S. (2009). Growth and characterization of dichlorobis l-proline Zn (II): A semiorganic nonlinear optical single crystal. *Journal of Crystal Growth*, 311(4), 1161-1165.
- [37] Caroline, M.L., & Vasudevan, S. (2009). Growth and characterization of L-phenylalanine nitric acid, a new organic nonlinear optical material. *Materials Letters*, 63(1), 41-44.

- [38] Kaviyarasu, K., Xolile Fuku, Gene T. Mola, E. Manikandan, J. Kennedy, and M. Maaza. Photoluminescence of well-aligned ZnO doped CeO<sub>2</sub> nanoplatelets by a solvothermal route. *Materials Letters*, 183(2016), 351-354.
- [39] Saravanan, T., & Saritha, G. (2013). Buck converter with a variable number of predictive current distributing method. *Indian Journal of Science and Technology*, 6(5S), 4583-4588.
- [40] Parthasarathy, R., Ilavarasan, R., & Karrunakaran, C. M. (2009). Antidiabetic activity of Thespesia Populnea bark and leaf extract against streptozotocin induced diabetic rats. *International Journal of PharmTech Research*, 1(4), 1069-1072.
- [41] Hanirex, D. K., & Kaliyamurthi, K. P. (2013). Multi-classification approach for detecting thyroid attacks. *International Journal of Pharma and Bio Sciences*, 4(3), B1246-B1251.
- [42] Kandasamy, A., Mohan, R., Lydia Caroline, M., & Vasudevan, S. (2008). Nucleation kinetics, growth, solubility and dielectric studies of L-proline cadmium chloride monohydrate semi organic nonlinear optical single crystal. *Crystal Research and Technology: Journal of Experimental and Industrial Crystallography*, 43(2), 186-192.
- [43] Srinivasan, V., Saravanan, T., Udayakumar, R., & Saritha, G. (2013). Specific absorption rate in the cell phone user's head. *Middle-East Journal of Scientific Research*, 16(12), 1748-50.
- [44] Udayakumar R., Khanaa V., & Saravanan T. (2013). Chromatic dispersion compensation in optical fiber communication system and its simulation, *Indian Journal of Science and Technology*, 6(6), 4762-4766.
- [45] Shah, M. A., Patel, H., & Raj, H. (2017). Methods for the Estimation of Ellagic Acid and Curcumin in Antidiabetic Herbal Formulations-A Review. *Eurasian Journal of Analytical Chemistry*, 12(4), 295-311.
- [46] Ghasemi, E., & Kaykhai, M. (2017). Determination of zinc, copper, and mercury in water samples by using novel micro cloud point extraction and UV-Vis spectrophotometry. *Eurasian J. of Analytical Chemistry*, 12(4), 324-313
- [47] Vijayaragavan, S.P., Karthik, B., Kiran, T.V.U., & Sundar Raj, M. (1990). Robotic surveillance for patient care in hospitals. *Middle-East Journal of Scientific Research*, 16(12), 1820-1824.