TAO ZHAO

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Full stack software developer with more than 10 years of professional experience and skills in studying and analyzing user requirements, leading the design, implementation, and optimization of software infrastructure, while solving problems with innovation and thoroughness.

# SKILLS

**Software architecture design and optimization**:

* Spring MVC model, Service oriented architecture, microservices, general software design patterns.
* Distributed data storage, session management, caching and messaging in distributed systems.
* Design and implementation of meaningful REST API.
* Implement secure, distributed cloud-based applications with large data sets.

**Programming languages:** Java, Ruby, Javascript, PHP.

**Javascript based single page application and mobile apps:** Vue.js, react.js, JQuery, Cordova, Quasar.

**Cloud-based services:** AWS application using AWS Lambda function, AWS API Gateway, S3 Bucket data management, AWS IAM management, AWS Storm data streaming.

**Web development framework and techniques**:

* Java Spring Boot
* Java Message Service (JMS)
* Drupal
* Ruby on Rails
* C#/.NET

**Databases:** Oracle, Mysql, redis, cassandra.

**DevOps:** TeamCity and CircleCI (CI/CD tools), Ansible, shell scripting, vagrant, virtualbox

**Web servers:** Nginx, Tomcat, Apache.

**Source control and Agile development:** GitHub, JIRA.

**Communication:** Excellent verbal and written skills in professional interpersonal communication to provide on-call support, problem resolution and professional customer service.

# PROFESSIONAL EXPERIENCE

## Software Engineer III

Federal Reserve Bank of Minneapolis, Minneapolis, MN

10/2021 – Present

Work as the principal technology staff at the team of research information service, leading the Ruby on Rails project of building the research data repository:   
Link to the repository: <https://researchdatabase.minneapolisfed.org/>.   
Code base: <https://github.com/curationexperts/cypripedium>

* Provide overall vision in designing and implementing the technical solutions, in response to the user requirements and service needs.
* Monitor the status of the AWS infrastructure running in different environments and provide real time feedback when problems emerge.
* Update and upgrade the code base, run CI/CD tests, generate new releases, and deploy the releases into running containers.
* Lead the Agile task management for the project, and lead the team to conduct functional and regression testing.
* Evaluate the security reports from the IT security company and resolve the security concerns.

## Senior Software Developer

MSCI Inc., Norman, OK

09/2018 – 10/2021

Develop and maintain the Cassandra and Spring cloud-based microservices for storage and application of massive investment data; work on a React.js UI platform and its JMS-connected Java backed to generate, visualize and export investment data reports.

* Added investment analysis tools and data such as new market data types, statistics, and financial stress tests, to the React.js based analysis UI. Used a combination of approaches including multithreading, file compression at web server, changing data structure to process hundreds of thousands of such investment type objects.
* Led the design and implementation of a non-interruptive, multithreading workflow to migrate portfolio and instrument data from one Oracle realm into another realm. At the same time modified the existing storage procedures to ensure the new imported data are saved into two realms simultaneously during migration.
* Enhanced retrieval of portfolios and instruments and display on the investment analysis UI. Took advantage of Solr indexing, file compression, modified JavaScript logic, and paging to reduce the loading time by 90%.
* Implemented the microservice architecture using Oracle database, and compared the efficiency of CRUD operations with Cassandra.
* Debugged and maintained the multithreading procedure to load investment portfolio and instrument data into Cassandra database.
* Implemented a two-dimensional database in Cassandra that ensures the correct storage of the timing information of portfolios and instruments.
* Improved the JMS based, service oriented backend java workflows to extract investment data and generate financial reports.
* Imported functional support for new investment portfolio types in the Cassandra database.
* Modified Spring boot configuration files to set up or modify data filters, database change events, mapping to Bitbucket repositories, etc.
* Monitoring the states of the Cassandra nodes, such as their activeness, memory usage, data loading and duplication speed, and then either solving the problems or reporting them to the infrastructure team.
* Trained two junior interns. Reviewed their work and helped them to write code and test cases.

## Information Technology Analyst III / Repository Developer

University of Oklahoma Libraries, Norman, OK

06/2014 – 09/2018

Designing and developing software solutions for the ingestion, preservation, and delivery of digital objects for library digital repositories.

* PHP coding on Drupal modules to customize and extend the functionality of the open-source library repository software, Islandora, which is used by OU digital collections at <https://repository.ou.edu/>
* Led the development of the oEmbed module to provide oEmbed service to embed digital books from into the web pages.  
  Code base: <https://github.com/OULibraries/islandora_embed>
* Customization of Islandora book viewer. Added some download links and a display list of metadata. Developed a module to generate PDF books using compressed derivative book page images to replace the original slow, inefficient out-of-box PDF book-generating module in Islandora. With this module, the time to generate a PDF book was reduced by 80%, and it also solved the problem of server fatigue during PDF book generation.  
  Code base: <https://github.com/OULibraries/islandora_solution_pack_book>
* Maintained and modified the OU Bagit Importer module to streamline the importing process into Islandra.  
  Code base: <https://github.com/OULibraries/ou_bagit_importer>
* Led the development of some other modifications on Islandora with code found at <https://github.com/OULibraries>
* In my personal spare time I worked on the “XProtocol” project, a single page/mobile application to manage scientific research protocols and relevant research data. XProtocol features the Cordova mobile framework, Vue.js, Cassandra database, and Java Spring boot.   
  Code base: <https://github.com/TingtingGu2014/Xprotocol>
* Customization of Oklahoma’s consortial [SHAREOK](https://shareok.org) DSpace repository.
* Writing and testing Ansible and shell scripts for deploying and maintaining Vagrant based virtual machines.

## PHP Developer

Paycom LLC, Oklahoma City, OK   
04/2013 – 05/2014

Developed and maintained the web applications which provide online services including human resource, payroll, and benefit administration.

* Development of a Java application “LibRepoTools”, to provide data services to the digital repositories at the University of Oklahoma Libraries. LibRepoTools is a lightweight, fast running Java application based on in-memory database which has the following functional modules:
  + - Utilizes available APIs or conducts web scraping to search and retrieve online publications by OU scholars.
    - Packages the data into specific formats to be imported into digital repositories or publishing platforms, such as DSpace and OJS (Open Journal System).
    - Runs a multithreading process to generate derivative small TIFF images from large TIFF files stored at AWS S3 buckets.
    - Features a JSP UI interface for users to upload and import data into DSpace repositories using DSPace APIs.

Code base: <https://github.com/OULibraries/LibRepoTools>

* Used AWS Lambda function to provide real time generation of small derivative TIFF/JPEG images from large, original image files when uploaded into S3 bucket and made use of AWS Storm streaming service to deliver the media conent.
* Used the FastCGI IIPImage server to build an image server on AWS, offering fast online image services with shared common protocols useful for International Image Interoperability framework (IIIF) implementations.
* As the lead developer, designed and developed the user-friendly and interactive online job application system, the Application Tracking System (ATS). Major contributions include realization of dynamically adding/deleting/editing/clearing/validating of individual application entries, session and server management, as well as the internationalization of ATS.
* Batch application and job applicant transfers. Batch application allows automated completion and submission of many job applications for similar but different job positions after the applicant finishes a single application.
* Initiated and developed the pagination of employee records based on number, id, or names. This pagination system also supports the storage and retrieving of data search parameters and conditions for future pagination purposes.
* Designed and implemented the filters to generate advanced SQL queries for information searching and reporting purposes. Optimized MySQL queries for better performance.
* Build up the employee web page documents. These documents allow the HR managers and the users to view and edit the employee application information, performance reviews, personnel action forms, OSHA reports, and employee-completed surveys in real-time.
* Implemented and customized the web pages and back-end classes for employee self-service. This included setting up the employee self-service profiles, organizing the customized employee input fields, as well as displaying the information for every section of the employee self-service profile.

## Software Engineer

PowerCosts Inc, Norman, OK   
06/2011 – 04/2013

## Software Engineer Intern

DCA Inc, Cushing, OK

01/2011 – 05/2011

## PHP Programmer Intern

K20 Center, University of Oklahoma, Norman, OK

05/2010-12/2010

## Functional Genomics Scientist

Department of Biology, University of Oklahoma, Norman, OK

08/2003 – 04/2010

# EDUCATION

* Master in Computer Science, 06/2011.University of Oklahoma, Norman, Oklahoma
* PhD in Zoology, 06/2011.University of Oklahoma, Norman, Oklahoma