



Terms of Reference (TOR)
for
Development, Integration and Deployment of
Single Sign-On (SSO) Software for Dhaka WASA

1. BACKGROUND

Water is a basic human need. Though for ages human civilization forms beside rivers. Dhaka, the capital of Bangladesh is the inhabitants of 20 million. The area of the city is around 1,082 square kilometers. Suppling water to a vast number of people is so much challenging. With this aim, Dhaka Water Supply & Sewerage Authority (DWASA) was established on 1963 as an independent organization with the mandate of Water Supply and Sewage disposal to the city dwellers of Dhaka. Residents of Dhaka enjoy one of the lowest water tariffs in the world, which limits the utility's capacity to invest. Dhaka WASA produces about 2590 million liter per day (MLD) potable water from deep tube wells and surface water treatment plants for 12.5 million people of the city of Dhaka. At present there are about 4,00,000 consumers of which about 325,000 are metered and the rest are non-metered. Consumers are of five categories – Domestic, Commercial, Industrial, Government and Community. Every year about 10,000 new service connections is being added.

2. OBJECTIVES OF THE PROJECT

Dhaka WASA has more than 30(thirty) software applications running on live servers. Applications are made with different programming languages such as some applications are in PHP, Codeigniter, Laravel, ASP.NET, Oracle APEX, Oracle Forms, JAVA, Spring Boot etc and databases mostly in Oracle and Mysql. Each application has its separate login credentials. For that reason, a user has to maintain a separate username and password for each application. It is very difficult for a user to maintain a bunch of usernames and passwords. So, the main objective of this service is to develop a single software module where a user signs in to one application and is then signed in to other applications of Dhaka WASA automatically. All the key business processes of other application of Dhaka WASA must remain unchanged.

3. SCOPE OF WORKS

For all the key activities and deliverables, the vendor has to consult with the MIS & Billing Department of Dhaka WASA. For new development of Dhaka WASA's Single Sign-on Software, it requires a modular approach of software development, in succession, where each module will follow a cycle of requirement assessment, designing and development, testing, integration, deployment and final roll out with training. The scope of work will include but not be limited to the following:

Requirements Gathering: Collaborate with Dhaka WASA stakeholders to understand specific authentication needs, existing systems, user roles, and access requirements.

Present Demo Application in Figma: Before designing the system, it is essential to create a presentation in Figma outlining the entire application process flow.

System Design: Develop an SSO architecture that aligns with Dhaka WASA's infrastructure, considering security **protocols**, such as SAML/ OAuth/ OpenID or active directory Connect.

User Interface Development: Create an intuitive and user-friendly interface for login, logout, password reset, and other necessary user interactions.

Browser Compatibility: The SSO system will compatible with all the modern browsers.

Existing Applications Access: All the access permissions for a user will remain unchanged for all software's of Dhaka WASA.

Authorization: Supports role-based access control (RBAC) access, User Based Access, Object based access. Supports seamless provisioning and DE provisioning of users, across different applications.

Scalability: Support seamless integrations with any number of application, without compromising efficiency and no need of extra coding in the application end. The solution will keep up with the growing and changing demands of DWASA.

Dynamic Configuration: The SSO system must have a dynamic configuration of applications weather an application will use SSO login or login without SSO. This configuration can be done from frontend.

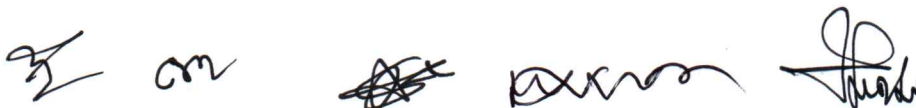
Security Measures: Implement robust security measures, including encryption, multi-factor authentication, and continuous monitoring for potential threats.

Report Development: Development of necessary reports related to the SSO system will be undertaken as per the requirements of the MIS & Billing Department of Dhaka WASA.

Database and Application Backup: A backup process for the database and applications must be developed.

Testing and Quality Assurance: Conduct thorough testing to ensure the SSO application functions correctly across various platforms, devices, and user scenarios.

Documentation: Provide comprehensive documentation and guidelines to MIS & Billing Department personnel of Dhaka WASA.



Deployment and Support: Deploy the SSO solution in a phased approach and offer ongoing support and maintenance post-implementation.

Existing applications: The following applications need to be refactored to enable integration with the SSO system.

SL No	Application Name	Programming Languages	Database
01	HRMS, Supply Chain Management, Vehicle Management,	Angular, Spring Boot	Oracle
02	Payroll	Oracle Forms 11g	Oracle
03	Leave Management, Training, Digital Software Diary, Laboratory, Utility Management Software, Empty Quarter Current Bill	Codeigniter,	MySQL
04	Law Software	Laravel	MySQL
05	Paperless, Budget management	Oracle APEX	Oracle
06	New Connection, Private Deep Tubewell	ASP.NET	Oracle
07	Complaint Management System	Angular, ASP.NET	MySQL
08	Telephone & Gas Bill Management	Codeigniter	MySQL
09	Dhaka WASA Board	Java, Spring Boot	Oracle
10	Bottle Pant Management Software, Santi water Sales system	Laravel	MySQL
11	DWASA Quarter Management	Laravel	Oracle
12	Smart Water Management Tools (SWMT)	PHP	MySQL
13	Land Information Software	Laravel	Oracle
14	Medical Software	Java, Spring Boot	Oracle

4. Project Implementation Schedule:

The estimated time for the development of “Single Sign-On Software for Dhaka WASA” will be 3 (three) months. This includes a) Software development b) Testing c) Deployment in live server and d) Handover and Training. After completion, the above tasks next 9 (nine) months will be maintenance & supporting service period.

	Month->	1	2	3	4	5	6	7	8	9	10	11	12
1	Requirement Analysis												
2	Software Development												
3	Software Testing												
4	Deployment in live server												
5	POST UAT modification												
6	Handover and Training												
7	Maintenance & Support service												

5. Development Tools and Platform

Particulars	Technology	Version
Software Development Methodology	Agile Scrum	Latest
Application Model	MVC Platform	Latest
Web Server	Apache Tomcat	Latest
API	REST architecture	Latest
Frontend Language	Vue JS / React JS	Latest Stable
Backend Programming Language	Java, Spring Boot	Latest Stable
Database	Oracle 19c/21c	Latest Stable
Server OS	Linux	LTS Version
Report Server	Oracle BI Publisher/Jasper Report	Latest Stable
Authentication System	Username, Password, Token	Latest Stable

6. Security Requirements

❖ SSO applications should have able to protect from the web attacks:

- Cross-Site Scripting
- SQL injection
- Broken Authentication
- Cross site resource sharing
- DoS attack
- Brute Force attack
- Session hijacking
- HTTP Flood

❖ Use VPN, Proxy Server (if needed)

❖ Testing

- Below listed testing should be completed before deployment in live environment
 - Proper user acceptance Testing.
 - Functional Testing
 - Load Testing
 - Integration Testing
 - Penetration Testing

❖ **Code Review**

- 15 (Fifteen) working days for code review & understanding and Technology handover.

7. EXPECTED DELIVERABLES

Following are the list of deliverables:

- Software Requirement Specification (SRS)
- Application Architecture
- Tools and Technologies with versioning.
- Project build documentation.
- Training materials and user manuals
- Complete source code
- Complete live database
- Deployment Process Document.
- Operation Manual
- Software Design Document.
- Data Backup Process. (In server level and also Cloud service based)
- Data Migration Process.
- Data Archiving Process.
- Coding conventions and file organizations.
- Networking Dependencies
- ER diagram
- DFD
- Use case diagram
- API documentation
- Networking Dependencies
- Software Design documentation
- Server Environment Setup
 - Docker Documentation (if any)
 - Deployment Process
 - System administration manual
 - Infrastructure and storage related documentation
 - Backup and Recovery Policies

8. STAFFING REQUIREMENTS

The proposed services under this Terms and references shall be carried out by using a firm with adequate experience in developing and delivering the expected output of the study. The firm should propose the structure and composition of its team members. It should list the main disciplines of the assignment the 'key experts technical and support staff. An indicative team structure may be as follows:



Sl. No.	Job Title	Qty.
1	Project Manager	1
2	Senior Software Engineer	1
3	Software Engineer	3
4	Database Administrator	1
5	System Administrator	1
6	Software Testing Engineer	1
7	Support Engineer	2

position	Duration (man months)	Qualification, experience and responsibility
1. Project Manager	3	Must have a minimum 8 years of experience in Software and Service Development. He/she must have relevant bachelor degree from a recognized university preferably in computer science and engineering or IT related subjects.. Must have experience of working with complex, multi system environments in public sector. Experience in developing SSO application is preferable. Project manager will take the overall responsibility for the execution of the assignments in accordance with the TOR and for the coordination of all professional inputs. He/she will be responsible to the employer and maintain close contact with procuring entity to ensure that the contact is implemented in accordance with the given TOR. The team leader will act as the consultant's authorized representative for both design and implementation supervision phase and make decisions on all matters pertaining to the consulting services.

2. Senior Programmer/Senior Software Engineer	2	Will be responsible to develop and maintain components and sub- components of Software applications. He will guide his subordinates in development and implementation of software systems. Responsibility: • Being involved in all aspects of software development lifecycle from requirements, design, and build through deployment. • Translating business requirements into working foundational components for
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	platform thus ensuring functional and non-functional aspects are met. • Guide a pool of Software Engineers including, programmers, analysts and support specialists. • Architecting platforms that are highly scalable, responsive and would serve as a foundation for building key enterprise components. • Documenting architectural standards, best practices and mentoring application teams on developing highly distributed, resilient and responsive applications. • To work with deployment and infrastructure teams to provision application software and platform components. • Effectively identifying opportunities for change, implements change and introducing new concepts, procedures, policies and tools while providing a clear explanation of benefits and purpose. Qualification and Experience • At least Bachelor's Degree in computer science/Computer Science & Engineering or IT related Subjects. • Must have at least 5 years of Practical experience of working in software development out of which at least 3 years of experience in Java and related frameworks (Spring MVC, Spring Boot, Hibernate etc) • 3+ years of practical experience in React JS, Vue.js. • Proficient with Software, Debugging, software customization, HTML/CSS, scripting language (e.g linux shell scripting) etc. Having strong problem-solving skills and ability to work independently or in a team.
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3. Software Engineer/Programmer	6	The Software Engineer would be responsible for the creation, maintenance and management of software components and their lower level sub-components. The incumbent is also required to interpret, use and apply information contained within IT architecture to inform a range of business improvement activities, particularly those involved in the design, development, enhancement and maintenance of various citizen services, e-services and govt application systems. The incumbent is expected to ensure that appropriate considerations are made for its security and quality. Responsibility: • Design and develop user interfaces to internet/intranet applications by setting expectations and features priorities throughout development life cycle; determining design methodologies and tool sets; completing programming using languages and software products; • Implementation of design including coding, white box testing, and documentation • Code maintenance including debugging and updating to keep pace with the evolving environment Defines site objectives by analyzing user requirements, envisioning system features and functionality. • Integrates applications by designing database architecture and server scripting, studying and establishing connectivity with network systems, search engine, and information servers. • Responsible for meeting software compliance standards; evaluates integration of software applications with the overall computing environment; and documentation, maintenance and software updates • Formulate detailed plans for the implementation of software solutions. In addition to program design this includes determining language, platform, and resource requirements
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		• Deployment of applications including cross-platform compliance and insuring availability of necessary resources • To work with deployment and infrastructure teams to provision application software and platform components. • Implementing and managing security or integrity and backup procedures • Effectively identifying opportunities for change, implements change and introducing new concepts, policies and tools while providing a clear explanation of benefits and purpose. Educational Qualification & Experience: • At least Bachelor's degree in Computer Science/Computer Science & Engineering or IT related subjects. • Must have at least 3 years of Practical experience of working in software development. • 1-2 years practical experience React JS or Vue.js. • Proficient with Software Debugging, software customization, HTML/CSS, scripting language (e.g Linux shell scripting) etc • Having strong problem-solving skills and ability to work independently or in a team • Must have a basic understanding of software development concepts, principles, and theory and demonstrate the ability to follow and apply basic use of programming and analysis concepts.
4. Database Administrator	2	Educational Qualification & Experience • At least Bachelor's degree in Computer Science/Computer Science & Engineering or IT Related subjects. • Must have 3 years of Practical experience in relevant fields. Professional Qualification: Responsibility: • Manage and monitor to running of an Oracle Database 12C/19C instance to

		understand how to manage network connections, security, and privileges on an Oracle Database 12C/19C database. • Manage Database concurrency and auditing is managed and implemented in Oracle Database 12C/19C • Use the Data Recovery Advisor to diagnose and repair failures • Perform an encrypted database backup and restore. • Able to work with Oracle Data Guard. • Describe Oracle Database backup methods and recovery operations that can be used to resolve database failure. • Plan effective backup and recovery procedures. • Use Recovery Manager (RMAN) to create backups and perform recovery operations • Prepare ADDM report for database performance monitoring and resource utilization. • Plan effective Data Migration Process.
5. System Administrator	1	Responsibility: • Familiarity with various operating systems and platforms • Ability to use shell scripting to automate routine maintenance activities • Proficient with Linux/ Windows platform. • Knowledge of system security • Can able to manage disaster discovery and backup techniques • Installing and maintaining physical server hardware and storage • Management and maintenance of servers, including the configuration of operating systems and virtualization • Proficient with VMWare and Data Center visualization • Install and configure software and hardware • Manage network servers and technology tools • Monitor performance and maintain systems according to requirements • Troubleshoot issues and outages

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		• Ensure security through access controls, backups and firewalls • Upgrade systems with new releases and models • Build an internal wiki with technical documentation, manuals and IT policies Educational experience: • At least Bachelor's degree in Computer Science/Computer Science & Engineering. • Must have 3 years of Practical experience in relevant fields. Professional Experience: He or she must have RHCSA, RHCE Certification, Linux certification, VMWare certification.
6. Support Engineer	18	The role of Support Engineer is to assist the software development team on Change Management Process. Must have good knowledge of System Development Life Cycle (SDLC) and Level 1 Customer Support. Responsibilities: • Devising training programs according to organizational or product requirements • Producing training schedules and agenda as per the need of the software implementation team. • Determining course content according to the objectives of the Software implementation Team. • Prepare training material (presentations, worksheets, manuals etc.) • Arrange for and conduct on-site training when needed. • Provide support to users in using software product and services • Handle complaints provide appropriate solutions and alternatives within the time limits; follow up to ensure resolution and performs monitoring of software product and services. • Troubleshoot system & network problems & diagnose hardware or software faults

		• Manage software and system incident, inventory and resources • Module/Report Development • Participate in Business requirement analysis Qualification and Experience • At least bachelor degree in CS, CSE, EEE, ETC, or ICT-related subject. • Must have 2+ years of Practical experience of software or technical training • Knowledge of modern training techniques and tools in technical subjects. • Experience in designing technical course content. • Ability to address training needs with complete courses. • Outstanding communication skills, multitasking and comfortable speaking to crowds • Experience in government project with similar experience will be given preference.
7. Software Testing Engineer	1	The role of Software Testing Engineer is to assist the software development team to deliver high quality software development tools on time. Must have good knowledge of System Testing Life Cycle and Software Quality Assurance. Responsibilities: • Develop test plan based on business requirement and technical specification documents that are needed to fulfill test objectives. • Prepare and maintain test bed and infrastructure. • Manual Testing: Sanity/Smoke Testing, Regression Testing, Functional Testing, User Interface testing, Ad hoc Testing, Cross Browser, Cross Platform testing, migration testing Black Box Testing, Google Analytics testing (by using GA Debugger add-ons, Keen io and Segment), API testing (By using POST, GET, etc. Method on Postman add-

	ons), Analytics testing (By using Charles proxy, Keen-io and Segment) etc. • Automation Testing: Smoke Testing, Regression Testing and Functional Testing. • QA Documentation: Create Test Plans, Test Scenarios & Test Cases, Identifying Test Data, Risk Analysis Reports, Test Case Specification, Test/Bug Report, QA Report etc. • Create and execute test cases for assigned feature(s) • Plan and write manual test cases while Dev Team begins coding work. Conduct testing as code is completed and merged to testing environment. • Report any bugs • Retest until all test cases are passing as expected • Conduct necessary testing • Evaluate and update test run i results • Keep manual test cases up to date as things inevitably change. • Update/retire and manual test cases that have been become obsolete • Perform Defect Tracking, Gap analysis, and Risk analysis with requirements Qualification and Experience: • At least Bachelor's Degree in computer science/Computer Science & Engineering or related subjects. • Must have 3 years of Practical experience of software quality assurance and testing. • Practical experience of using automated testing tools (i.e JMeter, Selenium, Rational Rose or equivalent) is must. • Having strong problem-solving skills and ability to work independently or in a team Certification on Software Quality Assurance or Testing will be a plus point.
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9. OTHER REQUIREMENTS

The vendor should have a valid up-to-date trade license, Incorporation certificate (if necessary), TIN with up-to-date Tax Return Certificate, BIN Certificate.

10. TRAINING

After deployment of this application in the live environment, the vendor must provide 15(Fifteen) working days of technology handover (tools & technologies, System administration, source codes, Application architecture, application process flow etc.) training sessions for 8 (Eight) personnel of the MIS & Billing Department. The firm will cover the training costs and provide materials and Dhaka WASA will provide training venue. Vendor must also provide Oracle Certified Professional (OCP) 19C Database Administration training from oracle certified partners/institutions for 2(two) personnel of MIS & Billing Department of Dhaka WASA.

11. PAYMENT PROCEDURE OF THE WORK:

Payment shall be made in line with agreed on outputs according the following schedule:

- **Inception & SRS Submission Report: Ten (10%)** percent of contract price shall be paid upon submission and acceptance of the inception report & SRS Documents. At the end of the first month from the date of the commencement.
- **Live Deployment Report & integration: Forty (40%)** percent contract price shall be paid upon submission of the SSO application development report and at least 8 (Eight) existing applications out of which minimum 1(one) Java related project, minimum 1(one) php related project and minimum 1(one) ASP.NET related project integration completed with SSO system dully accepted by the client.
- **Full Integration Completion Report: Forty (40%)** percent of the contract price shall be paid upon submission and acceptance of the Full Integration Completion Report. All required Integration will be completed in live system for all existing applications with the Single Sign-On (SSO) system. Training and project related all activities must be completed.
- **Project Completion Report: Ten (10%)** percent of the contract amount will be paid after successful completion of development phase & maintenance support service phase and upon submission and acceptance of project completion report.

N.B: Before every payment (except first payment), latest source code aligned with live system shall be submitted.

Need all time read and download access for updated production code in the Version control system (git,github,bitbucket,gitlab etc).

12. Live and UAT system Environment preparation

The software firm will prepare the Live and UAT environment for SSO system and related applications.



13. DEPLOYMENT PROCESS:

The software firm will submit all source code for deployment to the MIS & Billing Department of Dhaka WASA. Additionally, project build processes, deployment processes, and other related documents necessary for successful deployment shall also be submitted along with the source code. In some cases the software firm will verbally instructed the project build and deployment process to the MIS & Billing Department personnel. Additionally, the software firm will be responsible for physically deploying projects in critical cases.

14. SUPPORT FACILITIES:

The software firm will resolve Single Sign-On (SSO) related small and medium-level issues within 2 hours of submitting the support ticket. Complicated issues need to be resolved within the same day the support ticket is raised. Bug and support-related issues in the live system will be resolved through AnyDesk or remote connection facilitated by MIS & Billing Department of Dhaka WASA.

15. ADDITIONAL INSTRUCTIONS

Approval from the MIS & Billing Department of DWASA is required for each major step of the development lifecycle.

The major actions that shall requires approval of MIS & Billing Departments are:

- ❖ Technology will be used in the projects.
- ❖ Before deployment, any changes in the live system.
- ❖ Business/Process implementation.

No encrypted source code will be used in the project, and the source code must not be dependent on any resource that requires internet connectivity.

16. DURATION OF THE ASSIGNMENT

The duration of the assignment is 12 months. After signing the contract, the first 3 (three) months will be allocated for development, integration and live operation. Subsequently, maintenance and support services shall be provided for 9 (nine) months from the software delivery time.

17. THE PURCHASER/CLIENT WILL PROVIDE THE FOLLOWING SERVICES AND FACILITIES:

Client will provide following services and facilities when the project is ready to live.

- i) Domain , Hosting
- ii) Server
- iii) Networking infrastructure

Note: The Terms of Reference (ToR) is subject to change based on new requirements provided by Dhaka WASA.