



**MHRD**

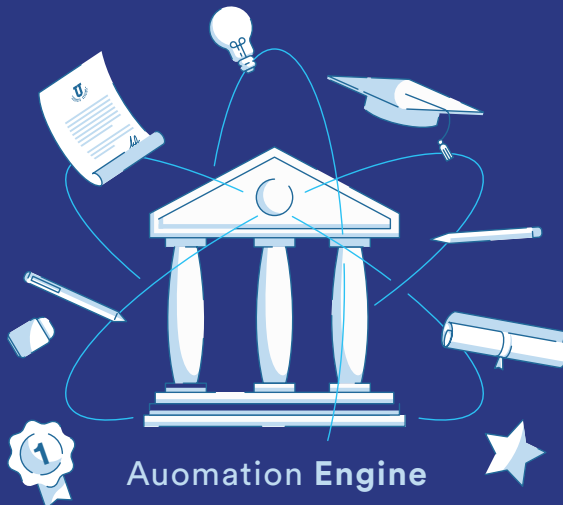
Government of India  
Ministry of Human Resource Development

# Samarth

An Open Source, Open Standard enabled Robust, Secure,  
Scalable and Evolutionary Process Automation Engine  
for Universities and Higher Education Institutions

Project Under

“National Mission in Education through ICT”



**Automation Engine**

# 01 Project Overview

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## 1.1 Introduction

*“An Open Source, Open Standard enabled Robust, Secure, Scalable and Evolutionary Process Automation Engine for Universities and Higher Education Institutions.”*

Enterprise resource planning (ERP) systems have been one of the most popular business management systems, providing benefits of real-time capabilities and seamless communication for business processes in large organizations. However, not all ERP efforts have been successful. Since ERP implementation affects the entire organization, its process, people, and culture, there are a number of challenges that an agency/institution may encounter in implementing ERP systems.

A university’s most valuable assets are faculty, students, and staff. Each has distinctive interests within the same organization. For faculty, a university is a place to teach, conduct research, and write. For students, it is a place to learn, live, and grow. For staff, it may share many features with corporate work, including management structure, hours, and HR practices. Recently, some universities have begun replacing their legacy systems with ERP systems to improve management and administration. Our Lab reviewed many studies that determine Critical Successful Factors (CSFs) and risk factors to implement ERP in a University and formulated an implementation approach that emphasized upon the organizational dynamics involved in ERP implementation by using Critical Functions and three phases of framework viz. precursor condition, implementation process, and outcomes.

Critical Success Factors (CSFs) are among the important issues that ERP literature focuses on. Approaches and issues of CSFs by case studies were identified, studied, analyzed, proposed and developed. CSFs are defined as a set of activities that need constant attention in order to plan and implement an ERP system. Despite the differences that exist between organizations’ environments, the main categories of technical CSFs are a concern of almost all universities. They are categorized as an organizational, technical, vendor, individual, cultural, social, political and national.

### The major CSFs include:

- ✓ Complexity
- ✓ Transparency in Process
- ✓ Security
- ✓ Flexibility and efficiency of use
- ✓ System’s response time to users’ requests
- ✓ Data quality, analysis, and conversion
- ✓ Minimum customization
- ✓ User-friendliness, help, and documentation

- ✓ Visibility of the system's status
- ✓ Robustness and error prevention
- ✓ Software development (evolution), testing and troubleshooting

## 1.2 Samarth Modules Snapshot

### 01 Student Services

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- ✓ Student Lifecycle
- ✓ Grievance Management
- ✓ Alumni Portal
- ✓ Training and Placement

### 03 Administration

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- ✓ File Management and Tracking System
- ✓ Research Project Management System
- ✓ Affiliation Management
- ✓ Content Federation System (CFS)
- ✓ Endowment Portal

### 05 HR

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- ✓ Recruitment System
- ✓ Employee Management
- ✓ Leave Management
- ✓ Residence Allocation Management

### 07 Knowledge Management

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- ✓ Research Management
- ✓ Knowledge Management
- ✓ ToT Management

### 02 Academics

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- ✓ Programme Management
- ✓ Academic Management
- ✓ Evaluation and Grading

### 04 Establishment

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- ✓ Estate Management System
- ✓ Inventory Management System

### 06 Accounts and Finance

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- ✓ Fee Management
- ✓ Payroll Management
- ✓ Budget and Accounts
- ✓ Procurement of Goods
- ✓ Bill Tracking System

### 08 Governance

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- ✓ RTI Management
- ✓ Legal Case Management System
- ✓ Central Data Unit
- ✓ University Web Portal
- ✓ Third-Party University Ranking Systems
- ✓ Minutes Archive & Retrieval System

### 2.1 Key Terms

- **MHRD** : Ministry of Human Resource Development
- **Project** : Project Samarth
- **DU** : University of Delhi
- **CU** : Central University selected for ERP implementation
- **HEI** : Higher Education Institution selected for ERP implementation
- **Nodal Officer** : Single point of contact at CU for Samarth Project
- **CA** : Competent Authority

### 2.2 Overview

Based on interactions held with MHRD, it emerged that there is a need to provide the developed framework to other Universities & HEIs. In the following chapters, details on the exhaustive “Project” for implementing in Central Universities (CU) have been provided.

### 2.3 Objectives of the Project

- ✓ Develop and maintain consistent data definitions;
- ✓ Increase data security, integrity, validity and reliability;
- ✓ Assure system-wide security and protection of confidential information;
- ✓ Seamless integration between technology and education delivery by providing a single platform based on new technologies and open standards;
- ✓ Access control/role-based access to data in real-time (for all its stakeholders) provide accessible, user-friendly administrative and student support services;
- ✓ Reduced the need for backup or shadow systems;
- ✓ A platform for re-engineering practices and continuous process improvements.

## 03 Implementation Methodology

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### 3.1 Onboarding

The onboarding process involves provisioning of ERP instance for CU under the SAAS model after selection.

**The steps involved are orderly listed below:**

- ✓ Project induction to Nodal Officer
- ✓ Formation of CU Project Group
- ✓ Provisioning of Demo ERP instance for CU
- ✓ Feedback about the system configuration from CU Nodal Officer
- ✓ Analysis, Time and effort estimation for carrying out configurations using PERT Method
- ✓ Review and Agree on Criteria for Prioritizing the configuration requirements with Nodal Officer
- ✓ Acceptance of configured ERP Instance by CU (Nodal Officer)

### 3.2 Roll-out/Deployment

Roll-out/Deployment starts after acceptance of provisioned instance by CU.

**Key functions undertaken under this are:**

- ✓ Support for initial configuration of ERP modules
- ✓ Training of system and department users
- ✓ On-site support for roll-out period of 2-3 months, extendable to 4-6 months.
- ✓ Ongoing remote support with periodic performance reviews for the project duration.

### 3.3 Roles and Responsibilities of Nodal Officer

The Nodal officer will champion Samarth ERP implementation in her/his University by participating actively in the project and ensuring smooth coordination for timely onboarding of academic and other units of the university.

**The Nodal Officer will be the single point of contact for the following, but not limited to, key activities:**

- ✓ Coordination with Samarth Team at University of Delhi
- ✓ To provide basic technical infrastructure and support to departments and other units of the university for using Samarth ERP

- ✓ Arrange technical human resources to be engaged with Samarth Team and Samarth ERP Roll Out Staff to be deployed at the university for smooth implementation
- ✓ To arrange regular training sessions related to the deployment
- ✓ To help in implementing Samarth ERP
- ✓ Timely provide all necessary approvals for the project implementation
- ✓ Arranging suitable accommodation/guest house for Samarth Team as and when required
- ✓ To arrange long term boarding and lodging of Maximum 2 Samarth ERP Roll Out Staff members at or nearby the university
- ✓ To setup a web-based video conferencing facility for day to day communication regarding the project
- ✓ To provide required information related to the institution's profile and level of existing automation of processes, if any.

### 3.4 Some Quick Statistics

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**11**

Core Functions

**40+**

Samarth Modules

**60+**

Sub-Modules/Features

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**100%**

Automation Engine  
for Universities



## 4.1 Samarth Modules

Functions	Modules	Sub-Modules/Features
→ University Details	Organisation Structure	<b>Organisational Map</b> <ul style="list-style-type: none"> <li>- Create organisational units and define hierarchies</li> <li>- Capture details of departments, faculty, colleges etc.</li> </ul> <b>Data APIs to display content and OU details on Website</b>
	Organigram	<b>Designation Map</b> <ul style="list-style-type: none"> <li>- Create Designations across organisational units</li> <li>- Define Hierarchies</li> </ul> <b>Data APIs to display organigram on Website</b>
	User Management System	<b>Role based access</b> <ul style="list-style-type: none"> <li>- User and System defined roles</li> <li>- Roles and permissions management</li> </ul> <b>Login Administration</b> <ul style="list-style-type: none"> <li>- Administrative logins for seat/designation based functions</li> <li>- Employee Logins</li> <li>- Student Logins</li> <li>- Multi Factor Authentication</li> </ul>
→ Student related services/activities	Student Lifecycle	<b>Student Portal</b> <ul style="list-style-type: none"> <li>- Student Profile (Personal Information)</li> <li>- Gateway for all activities and services available for Students</li> <li>- Login to track attendance, assignments, pay fee, participate in events etc.</li> <li>- Interface to provide Feedback</li> </ul> <b>Academic Records</b> <ul style="list-style-type: none"> <li>- Academic Progression</li> <li>- Assessment performance</li> <li>- Linkage with NAD, Aadhar etc.</li> </ul> <b>Library Integration</b> <ul style="list-style-type: none"> <li>- Integration with Open Library Management System to track issuance, returns, etc.</li> </ul>

Functions	Modules	Sub-Modules/Features
→ <b>Student related services/activities</b> (Continued)	Grievance Management	Online portal for filing Grievance Admin Portal to Manage Grievances <ul style="list-style-type: none"> <li>- Escalations</li> <li>- Redressal meetings and Resolution</li> </ul>
	Alumni Portal	Alumni Registration <ul style="list-style-type: none"> <li>- Auto registration for fresh graduates</li> </ul> Event Notification Alumni Feedback Alumni Meets/Seminars Donation Interface (linked with endowment portal)
	Training and Placementst	Company Portal Students Portal Admin Portal Internship and Job Opportunities Online posting and Application
→ <b>Academics</b>	Programme Management	Manage Programmes <ul style="list-style-type: none"> <li>- Create and manage Programmes based on UGC specified degrees</li> </ul> Manage Curriculum <ul style="list-style-type: none"> <li>- Create curricula across multiple term and part combinations</li> <li>- Create and Manage CBCS curriculum</li> </ul> Create Course Structure <ul style="list-style-type: none"> <li>- Approve curriculum/courses</li> <li>- Define admission and progression criteria and rules</li> </ul> Seats and fee configurations <ul style="list-style-type: none"> <li>- Configure category and gender based seats and fee</li> <li>- Define Fee rules</li> </ul>
	Academic Management	Time Table preparation & Dissemination Attendance Management Assignments & Feedback Forums and Blogs Academics Resources: Notes and - Online Material
	Evaluation and Grading	Examination Management <ul style="list-style-type: none"> <li>- Scheduling of Exams, Exam Fees, Hall Tickets, Seat Allocation</li> </ul> Result Preparation & Communication Mark card, Degree Printing



Functions	Modules	Sub-Modules/Features
→ <b>Academics</b> (Continued)	Evaluation and Grading (Continued)	<b>Transcripts &amp; Certificates</b> <ul style="list-style-type: none"> <li>- Online application interface</li> <li>- Fee payment</li> <li>- Request monitoring and administration</li> <li>- Student and administrative logins</li> </ul>
→ <b>Administration</b>	File Management and Tracking System	<b>Manage incoming and outgoing files</b> <b>Track files</b> <ul style="list-style-type: none"> <li>- Department wise</li> <li>- Active and Inactive files</li> <li>- Locked and Unlocked file</li> <li>- Re-opened Files</li> </ul> <b>Report generation</b> <b>File history</b> <ul style="list-style-type: none"> <li>- Activity Logs</li> </ul>
	Research Project Management System (RPMS)	<b>Research Project Approval</b> <b>Accounts</b> <ul style="list-style-type: none"> <li>- Sanction Orders</li> <li>- Record Expenditure</li> <li>- Generate Utilization Certificates</li> <li>- Statement of Expenditure</li> </ul> <b>Project Committee Management</b> <ul style="list-style-type: none"> <li>- Create and manage Project appointment committee, project purchase committee and other committees</li> <li>- Organise committee meetings</li> </ul>
	Affiliation Management	<b>Affiliation request</b> <ul style="list-style-type: none"> <li>- Online portal to submit affiliation requests in line with UGC policies</li> </ul> <b>Administration of affiliations</b> <ul style="list-style-type: none"> <li>- Monitor and manage affiliation status</li> </ul>
	Content Federation System (CFS)	<b>Federated content publishing for university web portal</b> <b>Role based access to Organisational Units to submit content for approval</b> <b>Content moderation and approval mechanism</b>
	Endowment Portal	<b>Online portal for endowment from alumni and public</b> <b>Payment Gateway Integration</b> <b>Issue Tax exemption certificate under Section 80G (2) (a) (iiif) of the IT Act, 1961</b>

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**Functions****Modules****Sub-Modules/Features**

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**→ Establishment****Estate Management System****Capture and track estate of the university**

- Details of rooms
- Details of washrooms
- Details of floor in a building
- Details of Roads and Footpaths in the campus area

**Employee Housing Records****House Allocation**

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**Inventory Management System****Stock Details**

- Inventory Category
- Purchases through GEM
- Returnable Items
- Consumable and Non Consumable Items
- Depreciation of items

**Metadata based****Asset Tracking**

- Asset Assignment

**Vendor Management****Report Generation**

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**→ HR****Recruitment System**

- UGC rule based Recruitment for Assistant Professors, Associate Professors, Professors

- Recruitment for non-teaching staff
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**Employee Management****Employee Record**

- Service Cadre
- Nationality
- Nature of employment

**Employee Dashboard****Career Advancement Scheme/APAR**

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**Leave Management****Leave dashboard**

- Employees on leave on the basis of day, week, month

**Leave Application**

- Leave record number
- Duration of leave
- Leave record of each employee

**Leave application for approval**

- Recommendation Requests
- Review Requests
- Sanction Requests

**Leave Cancellation Requests**

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Functions	Modules	Sub-Modules/Features
→ HR (Continued)	Residence Allocation Management	Allocating residences to university staffs Managing residences Maintenance of residences
→ Accounts and Finance	Fee Management	Customised fee rules for various services Fee administration <ul style="list-style-type: none"> <li>- Received and refunded payment</li> <li>- Public Payments</li> <li>- Check Payments</li> </ul> Event Fees Departmental Roles and Access Report Generation
	Payroll Management	7th CPC With Salary Customizable salary structures Income Tax Declaration/Deposition Form 16 and Form 24 reporting Tax Deduction Remittances PF Interest Calculation Automated recurring and non-recurring salary generation Multi level approval mechanism Employee Salary Slips
	Budget and Accounts	Formulation & Allocation Expenditure Monitoring Grants-in-Aid (for Sponsored Projects in RPMS) Budget and expenditure Other Charges Records Department Access Dashboards
	Procurement of Goods (linkage and Interfacing)	Integration with GEM and CPPP
	Bill Tracking System	Manage Vendor bill Payments <ul style="list-style-type: none"> <li>- Purchase orders</li> <li>- Capture Diary No., Date of passing from Finance Dept.</li> <li>- Objections raised</li> </ul> Activity Logs Report Generation

Functions	Modules	Sub-Modules/Features
→ <b>Knowledge Management</b>	Research Management	Research Scholar Profile <ul style="list-style-type: none"> <li>- Publications</li> <li>- Experience</li> </ul> Supervisor & Co-Supervisor Pre-Ph.D Seminar Online Thesis Management <ul style="list-style-type: none"> <li>- Online Thesis Submission</li> <li>- Thesis Approval</li> <li>- Thesis Evaluation by Examiners</li> <li>- BRS Meetings</li> <li>- Thesis Result Publishing</li> </ul>
	Knowledge Management	Publications Record <ul style="list-style-type: none"> <li>- Records of academic publications like books authored, editor approved chapters, research paper etc.</li> <li>- Data APIs to display information on Website</li> </ul> Patents Record <ul style="list-style-type: none"> <li>- Reports of Patents filed and granted</li> <li>- Data APIs to display on Website</li> </ul>
	ToT Management	Online Platform for training of the trainers Online quizzes/ evaluation
→ <b>Governance</b>	RTI Management	RTI Management workflow RTI dashboard <ul style="list-style-type: none"> <li>- Status of RTI- new, pending, responded</li> <li>- Forward to Departments</li> </ul> Role based access to CPIO and Appellate Authorities Report Generation Progress tracking <ul style="list-style-type: none"> <li>- Reminder to marked department</li> </ul>
	Legal Case Management System (LCMS)	Records of Legal Cases <ul style="list-style-type: none"> <li>- Hearing details date, week and month wise</li> <li>- Favour and Against Cases</li> </ul> Notifications Case decisions <ul style="list-style-type: none"> <li>- Case status</li> </ul>
	Central Data Unit	AQAR-NAAC Reports Departmental Access University Dashboard
	University Web Portal	Data APIs for website Integration with CMS

Functions	Modules	Sub-Modules/Features
→ <b>Governance</b> (Continued)	Third-Party University Ranking Systems	QS World The World University Ranking (WUR) IndiaToday University Ranking
	Minutes & Resolutions Archive & Retrieval System	Repository of minutes and files Role based access and retrieval
→ <b>Core Modules</b>	Core Communication System	Send Bulk/Targeted Emails Send Bulk/Targeted SMS Send Bulk/Targeted Push Notifications
	IT Service Desk (for University Computer Center)	Manage Incidents/Service Requests Manage SLAs Service Request for University IT Services Self Service Portal
→ <b>Other Services</b>	Sports	Sports Mapping Sports Facilities In Organization Sports/Gym Membership <ul style="list-style-type: none"> <li>- Register</li> <li>- Optional Fee Payment</li> </ul>
	Transport	Fleet Management <ul style="list-style-type: none"> <li>- Manage Vehicles</li> <li>- Assigning vehicles</li> </ul> Daily Tracking of vehicles Expenditure Reports <ul style="list-style-type: none"> <li>- Miles covered</li> <li>- Fuel Usage</li> </ul>
	Health	Health Dashboard <ul style="list-style-type: none"> <li>- List of Hospitals/Panel</li> <li>- Health Facilities</li> </ul> Subscription and memberships <ul style="list-style-type: none"> <li>- Membership Plans</li> <li>- Membership Records</li> <li>- Fee status and Fee Amount</li> <li>- Payment Integration</li> </ul> Health Record
	Security	University Helplines <ul style="list-style-type: none"> <li>- List multiple types of helpline, Contact authority, Helpline number and email</li> <li>- Track Status of helpline</li> <li>- Data APIs to display information on Website</li> </ul> Security Facilities <ul style="list-style-type: none"> <li>- Security Guidelines</li> <li>- Data APIs to display information on Website</li> </ul>

Functions	Modules	Sub-Modules/Features
→ <b>Other Services</b> (Continued)	Security (Continued)	<p>Awareness Programs/Workshops</p> <ul style="list-style-type: none"> <li>- Create programs with Program Type, Duration, Organiser, Feedback/outcome</li> <li>- Data APIs to display information on Website</li> </ul> <p>Incident Record</p> <ul style="list-style-type: none"> <li>- Resolution</li> <li>- Incident type</li> </ul>
	Essential Services	<p>Incident Management</p> <p>Amenities Subscription</p> <ul style="list-style-type: none"> <li>- Guest House</li> <li>- Conference hall</li> <li>- Parking</li> </ul>

## 4.2 Samarth eGov Suite - Roadmap

Product Rollout Phases	Modules	Total = 44 Modules
→ <b>Pack 01</b> (15 Modules)	01 Organisation Structure 02 Organigram 03 User Management System 04 Admissions System 05 Research Project Management System (RPMS) 06 File Management and Tracking System 07 Estate Management System 08 Inventory Management System 09 Recruitment System 10 Employee Management 11 Leave Management 12 Fee Management 13 Bill Tracking System 14 RTI Management 15 Legal Case Management System (LCMS)	
→ <b>Pack 02</b> (11 Modules)	01 Hostel Management 02 Training and Placement 03 Programme Management 04 Content Federation System (CFS) 05 Payroll Management 06 Budget & Accounts 07 Knowledge Management System 08 Sports 09 Transport 10 Health 11 Security	

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→ **Pack 03**  
(18 Modules)

- 01 Student Lifecycle
  - 02 Grievance Management
  - 03 Alumni Portal
  - 04 Academics Management
  - 05 Evaluation & Grading
  - 06 Affiliation Management
  - 07 Endowment Portal
  - 08 Residence Allocation Management
  - 09 Procurement of Goods (linkage and Interfacing)
  - 10 Research Management
  - 11 ToT Management
  - 12 Central Data Unit
  - 13 University Web Portal
  - 14 Third-Party University Ranking Systems
  - 15 Minutes & Resolutions Archive & Retrieval System
  - 16 Essential Services
  - 17 Core Communication System
  - 18 IT Service Desk (for University Computer Center)
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## 4.3 Salient Features of the System

### ✓ Single Sign-On

Web based Single sign-on with Optional LDAP integration

### ✓ Cross-Platform

“Samarth” is based on open standards, hence gives the flexibility to choose from the various available platforms for the deployment including Linux, UNIX and Windows.

### ✓ Interoperability

Each module exhibits great easy while exchanging information, hence a transaction flow, which requires passing through the multiple components can be easily implemented.

### ✓ Modularity and Scalability

“Samarth” modules can function as independent applications. The modular architecture enables the users to define the functional instance by selecting application modules relevant for the use case. The architecture is SAAS oriented and hence highly scalable.

### ✓ Security

“Samarth” addresses security at multiple layers. The entire framework works on RBAC (Role-Based Access Control) and requires multilevel authentication for business-critical functions. At the data layer, critical user information like passwords is encrypted prior to storage in the database. The web transactions are secured by implementing HTTPS (Access Control) and requires multilevel authentication for business-critical functions. At the data layer, critical user information like passwords is encrypted prior to storage in the database. The web transactions are secured by implementing HTTPS

### ✓ Logs

“Samarth” maintains a complete audit trail life cycle for each individual transaction.

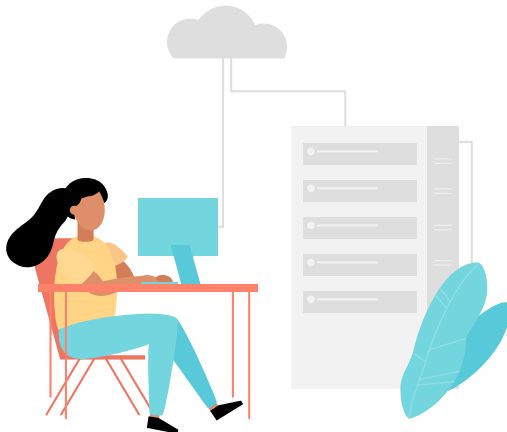
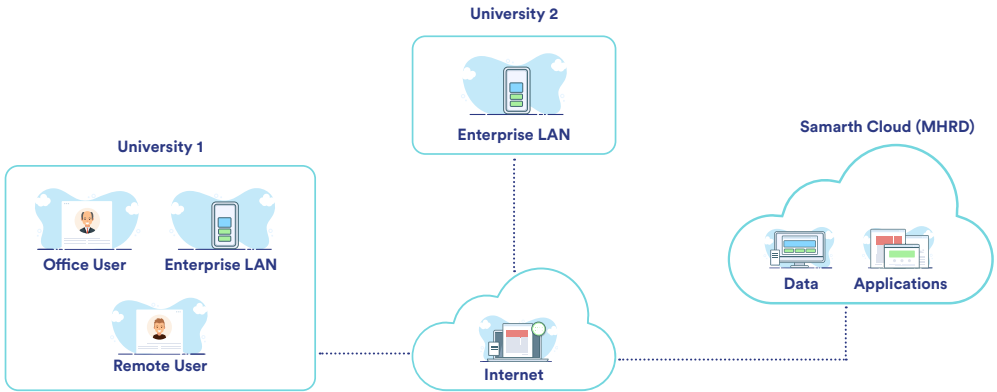
# 05 Deployment Architecture

## 5.1 Software as a Service (SaaS)

Where the system is hosted centrally on cloud and offered to other universities as a Service (SAAS)

→ Deployment Architecture - SaaS

- No Capex
- Quick Deployment & Roll Out



# SaaS

Software as a Service Architecture





# Project Samarth

Designed and Developed By



**IIC, UDSC**

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