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| **System Roles** | | | | | | |
| **Process** | **Human** | **Non-computing hardware** | **Computing hardware** | **Software** | **Database** | **Communication & Network** |
| Map Course Outcomes(COs) to Program Learning Outcomes (PLOs) | **IEB/ UGC/ Ministry of Education:**  1. Log into the SPMS dashboard.  2. Upload new accreditation manual or other standardization document for review.  **Head of Department / Dean of School/VC/Board of Trustees:**  1. View the new accreditation manual or other standardization document.  2. Share the received new accreditation manual  on SPMS with department staff and direct them to forward it to relevant faculty members.  **Department Office:**  1. Receive new accreditation manual from Dept Head/Dean of School/IEB through SPMS interface.  2. Forward the Accreditation Manual to the course coordinators/instructors to update the accreditation manual with defined COs and PLOs.  **Faculty/ Course Coordinator:**  1. Receive Accreditation Manual from department staff to update accreditation manual with defined COs and PLOs through SPMS.  2.List course content in the frontend.  3. List Course Outcomes(COs) in the frontend.  4. Map Course Content to Course Outcomes(COs) using front-end functionality.  5. Map Course Outcomes(COs) to PLOs using front-end functionality.  6. Create Assessments for each course (and section) assigned to an instructor.  10. Use personalized interface to make tables mapping  COs to questions in an assessment,  label the assessments (example: quiz 1, midterm, etc.)  be able to enter how many marks a question carries.  7. Map assessments and assessment  questions to COs and PLOs in related  tables in the front end for each  course.  8. Make first  version of Course Assessment Report. | **Pen and Paper:**  1. May be used for intermediate note-taking or brainstorming ideas. | **Personal Computer/ Phone:**  1. Used by IEB to upload accreditation manuals through the SPMS frontend.  2. Used by the Head of the department to share the accreditation manual with the staff.  3. May be used by Course Coordinators to make softcopies of Course Outlines, mapping Course Outline to Course Outcomes(COs), creating Assessment Questions mapping to COs, mapped COs to PLOs, and other necessary docs of the specific courses they are experts in and to map COs with PLOs.  **Printer:**  1. To print out hardcopies of Course Outcomes(COs) if needed. | **SPMS IEB/UGC frontend:**  1. IEB uses it to upload new accreditation manuals.  **SPMS faculty frontend/MS Word/Google Docs:**  1.Used for the faculties to list, edit and map COs and PLOs and display course assessment reports.  2.Used for collaboration amongst course instructors/coordinators.  **SPMS Dept Staff frontend:**  2. Used for department staff to send accreditation manuals to the course coordinator. | **SPMS RDBMS:**  1. A database is needed to store the necessary files,documents and reports that are produced to map COs and PLOs by the faculties, IEB and Head of the department. | **Internet:**  1. SPMS is a fully online web application: all packets and requests thereof are sent through the internet.  **Mail:**  1. Email is primarily used for communication.  **Phone:**  1. May be used for communication. |
| Record Student Assessment Data | **Faculty:**  1. Faculty gathers hardcopy/softcopy of assessment papers as pdf files from emails, google forms, google classroom of each assessment for each student and uploads those under those students for those courses under respective assessments.  2. Log into SPMS faculty dashboard  3. Faculty will be shown the courses they have/had for every semester under “Semester” Tab.  4. Select course (and section thereof).  5. Select Assessments (quiz/ exam/ project, etc.)  6. For each student, each student’s score for each question is uploaded after each assessment.  7. Save the scores for that assessment. | **A4 paper:**  1. Used for recording student’s on-site response to Exam/ Quiz/ Project, etc. questions.  **Google Forms**  1. Used for recording a student's remote response to the questions. | **Computer/ Phone:**  1. Used for accessing the SPMS frontend. | **SPMS faculty frontend:**  1. Provides user interface for the faculty to enter student assessment data. | **SPMS RDBMS:**  1. Stores student assessment data and derives student assessment information.  2. Sends email notifications to students at the end of each major assessment. | **Internet:**  1. SPMS is a fully online web application: all packets and requests thereof are sent through the internet.  **Email:**  1. Email is the primary method of notifying the students about major assessment stages. |
| Produce OBE Marksheet & Course Assessment Report & other docs | **Faculty:**  1. Use SPMS App to generate an OBE Marksheet for each course they are assigned to and upload the file of Course Assessment Report in docx or pdf.  2. Log in SPMS.  3. Go to option “Current Courses” under “Semester” Tab.  4. Select the intended course under “Current Courses” Tab.  5. Every course will have a button to “Create OBE Marksheet”, “Upload Course Assessment Report”, “Generate Analysis”, “Declare Verdict” and will do as the name suggests.  6. These will be generated from the assessments, COs and PLOs that were mapped to specific questions of an assessment in the Mapping CO and PLO phase and were stored in the database for a certain course.  7. The faculty can then save these generated reports in the database under the specific semester. | N/A | **Computer/ Phone:**  1. Used for accessing the SPMS frontend.  **Cloud Server:**  1. Access RDBMS data.  2. Process RDBMS data  3. Store processed/ grouped data back into RDBMS.  3. Calculate CO percentages and determines success | **SPMS Front-end/SPMS Assessment Generation Algorithm:**  1. Dynamically derive course assessment information (e.g. about CO and PLO achievement) based on course assessment data and PLO-CO mappings. | **SPMS RDBMS:**  1. For a specific course and student(s), retrieve PLO/ CO achievement data and tabulate them.  2. From tabulated data, derive outcome analysis and verdict.  3. Store and retrieve necessary reports | **Internet:**  1. SPMS is a fully online web application: all packets and requests thereof are sent through the internet. |
| View grades, download transcripts and View COs and PLOs achieved by a student in a course | **Students:**  1. Log into IRAS.  2. Search semester wise result for intended semester.  3. See grades for specific semesters.  4. Download transcript through browser into hard disk.  5. Log into SPMS.  6. Students can view courses sorted by semester.  7. After selecting a course, they can view the COs and PLOs they achieved in that course.  8. They can also view the breakdowns of the COs and PLOs, i.e. they can see how many marks they received for a question, the full marks for that question, and which CO and PLO it is associated to.  **Registrar’s Office/Admin:**  1. Access IRAS.  2. View students’ grades if and when necessary.  3.Download student’s transcript if and when necessary.  4. Log into SPMS App.  5. View all students sortable by name, id, department, admission date, course enrollment date/semester, and/or other criteria and view their overall CO and PLO achievements and a breakdown of it for each course. | **Pen and Paper**  1. Tabulated transcripts may be printed onto paper. Hardcopy is used as the primary source of truth during applications and other paperwork. | **Computer/**  **Phone:**  1. Used for accessing SPMS and IRAS.  **Printer:**  1. Used to print the tabulated transcript. | **SPMS Student frontend:**  1. View the list of PLOs and COs for a specific student  2. Stores grades of each completed course.  **IRAS:**  1. Generate student transcript  2. Provides the online user interfacefor viewing grades and transcripts. | **SPMS RDBMS**  **Registrar’s Office Storage:**  1. Student information is kept in admin for future reference.  **SPMS RDBMS:**  1. A Database Management Service is used to store, maintain, edit and achieved COs and PLOs of each student, student’s grade information and transcript in SPMS.  **Web Server:**  1. User interface and website pages are served using a remote web server. | **Internet:**  1. SPMS is a fully online web application: all packets and requests thereof are sent through the internet.  2. Softcopies of transcripts may be **mailed**. |
| Create student/faculty account and enter/customize necessary data | **Registrar Office:**  1. Sends user information/data to Admin for account creation or edit account data.  **Admin:**  1. Logs into SPMS dashboard.  2. Create new accounts for students/faculty.  3. Fills up the information required into the fields provided in the user interface.  4. Saves the new account.  5. View list of student/faculty and search for the student/faculty for whom data change/addition iis required.  6. Edit/Add requested changes by the Registrar's Office Staff of necessary faculty/student account information and save the changes. | **Pen and Paper:**  1. May be used for writing/ copying student/ faculty’s vital login information for account creation.  2.Hard copies of student/faculty data. | **Computer:**  1. Used for accessing and adding/editing data to SPMS/iRAS. | **iRAS:**  1. Provides user interface for add/managing accounts.  **SPMS:**  1. Provides UI for the add/edit account data  2.Shows new account input information fields.  3. Show a list of accounts & search bar for account search..  4. Provides editing of information fields.  5. Provide options to save account information/data.. | **iRAS Database:**  1. A Database Management Service is used to store, maintain, edit and receive account data.  **SPMS RDBMS:**  1. A Database Management Service is used to store, maintain, edit account data.  **Registrar Office Database:**  1. Hard copies of students/faculties information are stored here. | **Internet:**  1. SPMS is a fully online web application: all packets and requests thereof are sent through the internet.  2. iRAS is a fully online web application.  3. User interface and website pages are served using internet access.  **Manual:**  1.Registrar Office Sends hard copies of user information to the Admin. |
| View Records of OBE Marksheets, Course  Assessment Reports over a time period for inspection and analysis of student performance trend | **Faculty:**  1. Log into the SPMS faculty dashboard.  2. Click on the “Semesters” tab.  3. Specify search criteria (entire course, semester OR individual student) and time period for Performance Assessment report.  4. Click on “Generate OBE Marksheet/Verdict Report/Analysis Report” if the report is not already generated and stored in the system.  5. Download reports in PDF/Excel form.  **Department Head/ Dean/ VC/ Board of Trustees/ Admin/ Registrar’s Office:**  1. Log into SPMS Department Head dashboard.  2. View department  assessment report.  3. View Course  Assessment Reports  &  OBE Marksheets/Verdict Report/Analysis Report, searchable by year, courses, faculty.  4. Click on “Generate OBE Marksheet/Verdict Report/Analysis Report” if the report is not already generated and stored in the system.  5. Download reports in PDF/Excel form  6. View individual student reports.  **IEB/ UGC/ Ministry of Education:**  1. Log into SPMS Department Head dashboard.  2. View department  assessment report.  3. View Course  Assessment Reports  &  OBE Marksheets/Verdict Report/Analysis Report, searchable by year, courses, faculty.  4. Click on “Generate OBE Marksheet/Verdict Report/Analysis Report” if the report is not already generated and stored in the system.  5. Download reports in PDF/Excel form  6. View individual student reports | **Pen and paper:**  1. May be used for high-level note-taking. | **Cloud Server:**  1. Receive and process incoming requests.  **Computer/ mobile:**  1. View reports.  2. Save reports from browser to device. | **SPMS Faculty frontend:**  1. Provide user interface for online Faculty navigation.  **SPMS Student frontend:**  1. Provide user interface for online Student navigation.  **SPMS Student frontend:**  1. Provide user interface for online Student navigation. | **SPMS RDBMS:**  1. For a specific course and student(s), retrieve PLO/ CO achievement data from RDBMS and tabulate them.  2. View/Generate tabulated data, derive outcome analysis and verdict. | **Internet:**  1. SPMS is a fully online web application: all packets and requests thereof are sent through the internet. |
| Request for review and change of grades | **Student:**  1.Log into SPMS Student Dashboard.  2. Goes to desired course  2. Click on “Request Grade Change”.  3.Fills form e.g. with reason for grade change.  4.Submits the grade change request.  **Faculty:**  1.Logs into SPMS dashboard.  2. Reviews grade change request.  3. Review necessary assessments for grade change.  4. If change is needed, forward requests to change grades, and breakdowns of grade change (i.e. which questions of which assessment of a particular student for a particular course offered in a semester) to admin.  **Admin:**  1. Logs into SPMS dashboard.  2. Finds the specific student by  3. Uses a button in the interface to temporarily allow faculty to update grades for a course and in turn updating the grades of a specific student(s). | **Pen and paper:**  1. May be used for high-level note-taking.  2. Hard copies of student test papers used for review. | **Computer/Phone:**  1. Used for viewing and making changes to grades. | **SPMS Student frontend:**  1. Provide a user interface to make grade change requests.  **SPMS Faculty frontend:**  1. Provide a user interface for Course instructors to make grade changes.  **SPMS Admin frontend:**  1. Provide user interface to allow faculties to temporarily review and update grades. | **SPMS RDBMS:**  1. Changed grade data are stored here upon admin request. | **Internet:**  1. SPMS is a fully online web application: all requests therefore are sent through the internet. |
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