1.1. Domain Description

Human resources management (HRM) play a vital role in all businesses by organizing and managing all individual employees belonging to the organization. More specifically, HRM is responsible for introducing people into an organization, developing their abilities, employing them as resources, and finally compensating their services. In essence, HRM is responsible for the discovery and optimal usage of human resources.

Typically, HR processes require a lot of effort and manpower; much of this effort comes from communicating with all employees of an organization and tracking them with respect to training, time allocation, and compensation. With this perspective, it is accurate to say that the bulk of many HR processes boils down to data collection from the employees of the organization, and analysis of this data leads to the formation of workforce strategies. As expected, the effort required is, consequently, proportional to the size of the organization.

With organizations growing at explosive rates due to globalization, the effort required for HR is growing at a tremendous rate as well. Thus, specialized HRM systems that automate many of these process have become a cost-effective solution for organizations to pursue. These specialized HRM systems represent a new approach to the process by utilizing techniques from the information technology field. These techniques involve automating tedious tasks on a large scale by outsourcing data collection to individual employees via a centralized information collection scheme. As a result of the data collection, analyses can be performed to determine enterprise strategies (going from employee-level data collection to developing strategies that affect the entire enterprise-level as a whole).

For an HRM system to be effective, certain types of data at a minimum must be collected. These include, but are not limited to, personnel information, headcounts, expenses, compensation, training, and performance evaluations. Using this data, a HRM system can perform high-level reporting and trend analysis; thus, replacing the manual labour of end-to-end HR processing. In the end, the goal of such a system is to further automate the interaction between HR and an employee.

1.2. Envisioned System

An ideal HRM system would automate all HR processes and would be highly available to employees of an organization. As such, it is envisioned that the HRM system would be a comprehensive suite of web-based tools for end-to-end human resource interaction.

The first required capability of such a suite is the ability to store employee information such as user information, salary, address, and personal information. Centralization of this information would aid in correspondence with other functions of the HR management system such as compensation. It is envisioned that this user profile

would act as the crucial link between an employee and any action HR takes upon that employee.

Another portion of the system would allow for project-level time tracking (including work hours and PTO) and expense reporting. Data can be collected in the form of timesheets and expense claims/receipts. This data will facilitate the accounting department in compensating any employee; consequently, the appropriate amount of payment (whether salary or hourly rate) can be made to the employee. This compensation process can be further automated with an interface to a banking system that allows for direct depositing or check delivery to the employee (based on an employee profile).

On the other hand, using employee inputs for time and financial tracking, the system can also generate reports for management that facilitate budget analysis and time/resource allocation. Managers can use the reports to see where resources are being allocated and how much money is going through a particular resource. This can aid in project management and calculation of return of investments (ROI) for a particular employee.

Additionally, the envisioned HRM system can aid managers in doing performance evaluations for an employee. The evaluation should eventually be accessible to the employee, and be used by accounting and HR to make compensation adjustments. Furthermore, the system can be the one-stop shop for training and employee development. This includes watching video tutorials and information posted by HR. The system should facilitate this by having some content management infrastructure in place for HR to post new documents and media.

Lastly, the system should be designed in a generic way such that it can be used across multiple businesses as a human resource management solution. The goal is to have an easily deploy-able solution to be marketed to various organization of medium to large sizes.

1.3. Stakeholders

1. What are the visions /expectation of the system
2. What are their roles w.r.t. the development project (business expert, enduser, customer,…)?
3. What are their roles w.r.t. the domain?
4. In what part of the organization do they work?
5. What is the impact if their visions/expectations are not met?

These questions from the stakeholders are answered in the above questions order.

- Consumers
    - ***i.*** Businesses as customers
        1. Vision: The system should be re-usable for use of multiple

customers. Legacy systems should not be used

2. Roles w.r.t. development project: Reviewers of the existing architecture which is being developed.
3. Roles w.r.t domain: External business customers who may use the system in future.
4. Part of organization:
   They work outside the existing company in different companies of the parent company
5. Impact if vision not met:
   The impact of their needs not met will be that the Human resource system would not be entirely re-usable and tied to one specific company.

ii. Internal business users

1. All employees
   a. Vision: Employees would like to see a system which is created for use of use and accurate and not changed for years to come.
   b. Roles w.r.t. development project
      - End user of the system for pay checks.
   c. Roles w.r.t domain:
      - Most important stakeholder on the architecture as payroll is key feature of the system
   d. Part of organization:
      - entire organization.
   e. Impact if vision not met:
      - Vision not met means that there is no employee satisfaction and resentment in the organization.

2. HR
   a. Vision: Create a one stop system for employees as well as HR functions like training and performance review and pay raise management to rule out any paper work or manual intervention by the HR personnel for their large employee base.
   b. Roles w.r.t. development project
      - Key stakeholders who are involved in every aspect of the project
   c. Roles w.r.t domain:
      - Key stakeholders who initiate the requirements for the domain.
   d. Part of organization:
      Human resource managers and employees including training department employees.
   e. Impact if vision not met:
      System predominantly designed to replace manual

functions of employee performance review and training so if needs not met then there would be a lot of manual intervention from this stakeholder.

3. Management
    a. Vision: The system should be reliable to make payroll payments to all employees including themselves. All training functions and performance evaluations to be automated so that the number of employees in the HR, training & finance department can be minimized.
    b. Roles w.r.t. development project
        - supervisory roles
    c. Roles w.r.t domain:
        - Main funding source for the system
    d. Part of organization:
        - Top level management personnel like CEO,Executive VP,VP and General Managers of the company.

    e. Impact if vision not met:
    The company will not run on the automated way wanted and there will be a lot of resources to be on payroll leading to waste in manpower resources hired in the company.
4. Payroll
    a. Vision: Ease the jobs of accounting and payroll functions like repeated issuing of paycheck. Minimize errors in accounting for employee pay roll. Automation means less but efficient employees in payroll for the company.
    b. Roles w.r.t. development project
        - Oversees that the main functions of payroll are satisfied by the system.
    c. Roles w.r.t domain:
        - Key stakeholder who jobs become automated with the system.

    d. Part of organization:
        - Payroll employees

    e. Impact if vision not met:
        - Payroll is the key internal customer whose needs need to be met as the key function of the system is payroll automation. If this is not met then the system is useless.
5. Marketing department
    a. Vision: Market the system to other parent sister companies and also have a stretch goal to sell to external customers.
    b. Roles w.r.t. development project

        - Input to the system for base features which should exist in a generic human resource management system.
    c. Roles w.r.t domain:
        - Feedback to other stakeholders for the needs of other internal and external customers.
    d. Part of organization:
    External marketing and internal marketing employees
    e. Impact if vision not met:
    The stakeholder represent future customer. Their needs are important for the reuse of the system across the sister companies. It is nice to have their feedback during the requirements face for consideration.

- Producers
    1. IT department and developers
        a. Vision: Provide infrastructure and tools and staff for the development and execution of the project. Key constraints of resources and IT budget should be understood for the project.
        b. Roles w.r.t. development project
            - Development and maintenance team of system.
        c. Roles w.r.t domain:
            - Organization within the company which is the source of the requirements related to what can be delivered and in which time frame and budget and resource constraints.
        d. Part of organization:
        IT department personnel supporting the customers as well as developers who are initially developing the release of the software for the system.
        e. Impact if vision not met:
        Stakeholders who are the ones who are going to develop the system with actual constraints. Their needs are important for the successful execution and completion of the desired system.

1.4. Functional requirements

1.4.1. Function specifications

- User Management
    - Authenticate User

    - Description: An authentication scheme must be present in order to determine the access levels an end-user has (decide if manager, HR, employee)
    - Inputs
        - Requested login
        - Username
        - Password
    - Outputs
        - User (access controls and granted permissions)
    - Requirements: central data store with user information to authenticate against
    - Performers: any user attempting to access the functionality of the system (all consumers/end-users)
    - Location: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Requested login") AND (Input("Username") AND Input("Password"))
    - Post-Conditions
        - Successful execution of this function requires that a given username and password corresponds to already saved credentials. Upon completion, the username and password will be verified with the user data store, and the user's permission levels will be retrieved if the user exists. However, if a user cannot be authenticated against the data store, no permission details will be retrieved, and the user will be redirected to attempt authentication again.
        - Get(User) OR Authenticate_User()
- Add user
    - Description: An authentication scheme must be present in order to determine the access levels an end-user has (decide if manager, HR, employee). This function ensures that valid end-users can be added and used in the process of authentication. New users should be added and necessary permissions granted based on their employment status. New users are notified by email whn they are added. This function is only valid for users authenticated as part of HR.
    - Inputs
        - Request to add user
        - Authenticated HR user
        - Username to be added
        - Password for new user
        - Employment information of new user

    - Outputs
        - Saved User
        - Email
    - Requirements: central data store with user information to save to
    - Performers: HR personnel
    - Location: Human resources department
    - Pre-Conditions:
        - Event(“Request to add user”) AND Authenticate(User) AND (Input(“Username”) AND Input(“Password”) AND Input(“User Information”))
    - Post-Conditions
        - Successful execution of this function implies that the new user is registered in the system along with information pertaining to his/her employment and permission levels. Additionally, the saved user is sent a notification email.
        - Save(Target User) AND Sent(Email)
- Query user
    - Description: For viewing purposes, HR must be able to fetch any information regarding an employee. This function ensures that such information can be queried about any employee registered in the system. This function is only valid for users authenticated as part of HR.
    - Inputs
        - Request to fetch user
        - Authenticated HR user
        - First name
        - Last name
        - Username
        - Email
    - Outputs
        - Stored user
    - Requirements: central data store with user information to save to
    - Performers: HR personnel
    - Location: Human resources department
    - Pre-Conditions
        - Event(“Request to add user”) AND Authenticate(User) AND (Input(“First name”) OR Input(“Last name”) OR Input(“Username”) OR Input(“Email”))
    - Post-Conditions
        - Get(Target User)
- Edit user
    - Description: In situations in which an employee’s status

changes (e.g. promotion, transfer, bonus), the employee's registration in the system must be modified accordingly. This functions ensures that a user is properly modified in the system. This function is only valid for users authenticated as part of HR.
    - Inputs
        - Request to edit user
        - Authenticated HR user
        - User to be edited (retrieved from query function)
        - Employee information to append
    - Outputs
        - Saved user
        - Email
    - Requirements: central data store with user information to modify
    - Performers: HR personnel
    - Location: Human resources department
    - Pre-Conditions
        - Event("Request to edit user") AND Authenticate(User) AND Query(Target User) AND Input("Modified user information")
    - Post-Conditions
        - Successful execution of this function implies that the queried user will be modified in the system with respect to the inputted changes (personal information, employment status, etc.)
        - Save(Target User) AND Sent(Email)
- Delete user
    - Description: To accommodate employees that have left the organization or whose employment has been terminated, this function exists to remove them from the system. This function is only valid for users authenticated as part of HR.
    - Inputs
        - Request to delete user
        - Authenticated HR user
        - User to be removed (retrieved from query)
    - Output
        - Deleted user
    - Requirements: central data store with user information to modify
    - Performers: HR personnel
    - Location: Human resources department
    - Pre-Conditions
        - Before this function is executed, the user to be deleted must be a queried user.
        - Event("Request to delete user") AND

Authenticate(User) AND Query(Target User)
    - Post-Condition
        - Successful execution of this function implies that the queried user will be removed from the system.
        - Delete(User)
- Time tracking
    - Create timesheet
        - Description: All employees should have the ability to create a timesheet in which they can track current working project and the amount of time being allocated towards that project.
        - Inputs
            - Request to create timesheet
            - Authenticated user
            - Timesheet date range
            - Project worked on
            - Number of hours allocated toward regular work hours
            - Number of hours allocated towards paid time off
        - Output
            - Saved timesheet
        - Requirements: central data store with historical timesheet data
        - Performers: Employee
        - Locations: Any employee's cubicle (accessible to all employees)
        - Pre-Conditions
            - Event("Request to create timesheet") AND Authenticate(User) AND Input(Timesheet Date Range) AND ((Input(Project Name) AND Input(Number of Regular Work Hours)) OR Input(Number of Paid Time Off Hours))
        - Post-Condition
            - Save(Timesheet)
    - Query timesheet
        - Description: All employees should have the ability to view timesheets they have created (applies to both historical data and current timesheets). Employees should only be able to view their own timesheets. However, this function does allow querying aggregated sets of timesheets for administrative functions
        - Inputs
            - Request to fetch timesheet
            - Authenticated user
            - Timesheet date range
        - Outputs

        - Stored timesheet
    - Requirements: central data store with saved timesheet data
    - Performers: Employee
    - Locations: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to fetch timesheet") AND Authenticate(User) AND Input("Timesheet date range")
    - Post-Conditions
        - Get(Timesheet)
- Modify timesheet
    - Description: All employees should have the ability to modify their own timesheets since timesheets are generally filled in incrementally on a daily basis. Employees should be able to revise any inputted hours and time allocations for previous timesheets for re-submission.
    - Inputs
        - Request to modify timesheet
        - Authenticated user
        - Timesheet to edit (ID or date range)
        - Timesheet modifications
    - Outputs
        - Stored timesheet (modified)
    - Requirements: central data store with saved timesheet data
    - Performers: Employee
    - Locations: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to modify timesheet") AND Authenticate(User) AND Query(Target Timesheet) AND Input(Modified timesheet data)
    - Post-Conditions
        - Save(Timesheet)
- Submit timesheet
    - Description: All employees can submit a completed timesheet for approval by management. Once a timesheet is submitted, an email is sent to the user's supervisor. This email will request the supervisor to view the submitted timesheet for approval.
    - Inputs
        - Request to submit timesheet
        - Authenticated user
        - Timesheet to submit (ID or date range)

        - Outputs
            - Email to supervisor
            - Modified timesheet (indicates submitted state)
        - Requirements: central data store with save and finalized timesheet data
        - Performers: Employee
        - Locations: Any employee's cubicle (accessible to all employees)
        - Pre-Conditions
            - Event("Request to submit timesheet") AND Authenticate(User) AND Query(Target Timesheet)
        - Post-Conditions
            - Sent(Email)
            - Save(Timesheet)
    - Approve timesheet
        - Description: After an employee submits a time sheet, it is required that management approves the timesheet for proper payment processing. Approval indicates that the employee's supervisor acknowledges the time allocated and verifies the timesheet's validity.
        - Inputs
            - Request to approve timesheet
            - Authenticated user (management)
            - Timesheet to approve
        - Outputs
            - Email
            - Modified timesheet (indicates approved state)
        - Requirements: central data store with timesheet data with ability to mark a timesheet as approved
        - Performers: Managers
        - Location: Management
        - Pre-Conditions:
            - Event("Request to approve timesheet") AND Authenticate(User) AND Query(Target Timesheet)
        - Post-Conditions
            - Sent(Email)
            - Save(Timesheet)
- Expense tracking
    - Create expense report
        - Description: All employees should have the ability to create an expense report in which they can track expenditures made on a personal finance account (to be reimbursed by the organization).
        - Inputs
            - Request to create expense report
            - Authenticated user

        - Title
        - Date of purchase
        - Itemized listing of expenditures
        - Reason for expenditures
        - Total dollars spent
        - Attached receipts
    - Output
        - Saved expense report
    - Requirements: central data store with historical expense report data
    - Performers: Employee
    - Locations: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to create expense report") AND Authenticate(User) AND Input(Title) AND Input(Date of Purchase) AND Input(Itemized listing of expenditures) AND Input(Reason for expenditures) AND Input(Total dollars spent) AND Input(Attached receipts)
    - Post-Condition
        - Save(Expense Report)
- Query expense reports
    - Description: All employees should have the ability to view expense reports they have created (applies to both historical data and current expense reports). Employees should only be able to view their own timesheets. However, this function does allow querying aggregated sets of expense reports for administrative functions
    - Inputs
        - Request to fetch expense report
        - Authenticated user
        - Expense report title
        - Expense report ID
    - Outputs
        - Stored expense report
    - Requirements: central data store with saved expense report data
    - Performers: Employee
    - Locations: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to fetch expense report") AND Authenticate(User) AND (Input("Expense report title") OR Input("Expense report ID"))
    - Post-Conditions

        - Get(Expense report)
- Modify expense report
    - Description: All employees should have the ability to modify their own expense reports since additional expenditures may need to be added to the report. Employees should be able to revise any inputted expenditures and attach additional receipts if required.
    - Inputs
        - Request to modify expense report
        - Authenticated user
        - Expense report to edit
        - Modified expense report data
    - Outputs
        - Stored expense report (modified)
    - Requirements: central data store with saved expense report data
    - Performers: Employee
    - Locations: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to fetch expense report") AND Authenticate(User) AND Query(Target Expense Report) AND Input(Modified expense report data)
    - Post-Conditions
        - Save(Expense report)
- Submit expense report
    - Description: All employees can submit a completed expense report for approval by management. Once an expense report is submitted, an email is sent to the user's supervisor. This email will request the supervisor to view the submitted expense report for approval.
    - Inputs
        - Request to submit expense report
        - Authenticated user
        - Expense report to submit
    - Outputs
        - Email to supervisor
        - Modified expense report (indicates submitted state)
    - Requirements: central data store with save and finalized expense report data
    - Performers: Employee
    - Locations: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to submit expense report") AND Authenticate(User) AND Query(Target Expense

Report)
        - Post-Conditions
            - Sent(Email)
            - Save(Expense report)
    - Approve expense report
        - Description: After an employee submits an expense report, it is required that management approves the expense report for proper compensation. Approval indicates that the employee's supervisor acknowledges the expenditures incurred and verifies the validity of the expense report.
        - Inputs
            - Request to approve expense report
            - Authenticated user (management)
            - Expense report to approve
        - Outputs
            - Email
            - Modified expense report (indicates approved state)
        - Requirements: central data store with expense report data with ability to mark a expense report as approved
        - Performers: Managers
        - Location: Management
        - Pre-Conditions:
            - Event("Request to approve expense report") AND Authenticate(User) AND Query(Target Expense Report)
        - Post-Conditions
            - Sent(Email)
            - Save(Expense report)
- Performance Evaluations
    - Create performance evaluation
        - Description: All members of management should have the ability to create a performance evaluation of a particular employee.
        - Inputs
            - Request to create performance evaluation
            - Authenticated user (management)
            - Target employee username
            - Performance survey
        - Output
            - Saved performance evaluation
        - Requirements: central data store with historical performance evaluation data
        - Performers: Managers
        - Location: Management
        - Pre-Conditions
            - Event("Request to create performance evaluation")

AND Authenticate(User) AND Query(Target Employee) AND Input(Performance survey)
    - Post-Condition
        - Save(Performance Evaluation)
- Query performance evaluations
    - Description: All managers should have the ability to view performance evaluations they have created (applies to both historical data and current performance evaluations). This function allows managers to view all performance evaluations under their name; moreover, non-management employees can also view their own performance evaluations.
        - Request to fetch performance evaluation
        - Authenticated user (management or general employee)
        - Target Employee
    - Outputs
        - Stored performance evaluation
    - Requirements: central data store with saved performance evaluation data
    - Performers: All employees and managers
    - Location: Any employee's or manager's cubicle (accessible to all employees/managers)
    - Pre-Conditions
        - (Event("Request to fetch performance evaluation") AND Authenticate(User)) OR Input(Target Employee)
    - Post-Conditions
        - Get(Performance Evaluation)
- Modify Performance Evaluation
    - Description: All managers should have the ability to modify their own performance evaluations since additional changes may be made to the evaluation.
    - Inputs
        - Request to modify performance evaluation
        - Authenticated user
        - Performance evaluation to edit
        - Modified performance evaluation data
    - Outputs
        - Stored performance evaluation (modified)
    - Requirements: central data store with saved performance evaluation data
    - Performers: Managers
    - Location: Management
    - Pre-Conditions
        - Event("Request to fetch timesheet") AND

Authenticate(User) AND Query(Target Performance Evaluation) AND Input(Modified performance evaluation data)
    - Post-Conditions
        - Save(Performance evaluation)
- Submit Performance Evaluation
    - Description: All managers can submit a completed performance evaluation for approval by HR. Additionally, submission of a performance evaluation ensures that the employee corresponding to the evaluation is notified of their evaluation. Once a performance evaluation is submitted, an email is sent to the employee and HR. This email will request the employee and HR to view the submitted performance evaluation.
    - Inputs
        - Request to submit Performance Evaluation
        - Authenticated user
        - Performance evaluation to submit
    - Outputs
        - Email to target employee
        - Email to HR
        - Modified performance evaluation (indicates submitted state)
    - Requirements: central data store with save and finalized performance evaluation data
    - Performers: Managers
    - Location: Management
    - Pre-Conditions
        - Event(“Request to submit performance evaluation”) AND Authenticate(User) AND Query(Target Performance Evaluation)
    - Post-Conditions
        - Sent(Email to target employee) AND Sent(Email to HR) AND Save(Performance Evaluation)
- Approve performance evaluation
    - Description: After a manager submits a performance evaluation, it is required that HR approves the performance evaluation for proper compensation. Approval indicates that HR acknowledges the evaluation given and verifies compensation to be given (bonuses).
    - Inputs
        - Request to approve performance evaluation
        - Authenticated user (HR)
        - Performance evaluation to approve
    - Outputs
        - Email

            - Modified performance evaluation (indicates approved state)
        - Requirements: central data store with performance evaluation data with ability to mark a performance evaluation as approved
        - Performers: HR personnel
        - Location: Human resources department
        - Pre-Conditions:
            - Event("Request to approve performance evaluation") AND Authenticate(User) AND Query(Target Performance Evaluation)
        - Post-Conditions
            - Sent(Email) AND Save(Performance Evaluation)
    - View performance evaluation
        - Description: An employee should have the ability to view their supervisor's performance evaluation of themselves. This function exists to ensure that an employee can review their survey in a read-only fashion
        - Inputs
            - Request to view performance evaluation
            - Authenticated user (any employee)
        - Outputs
            - Read-only performance evaluation
        - Requirements: central data store with performance evaluation data.
        - Performers: any employee
        - Location: Any employee's cubicle (accessible to all employees)
        - Pre-conditions:
            - Event("Request to view performance evaluation") AND Authenticate(User) AND Query(Employee's Performance Evaluation)
        - Post-Conditions
            - Get(Employee's Performance Evaluation)
- Expense analysis (administrative)
    - Generate budget analysis report
        - Description: In order to forecast growth of the organization, data collected from expenditures and timesheets could be analyzed to discover any trends in budget allocation. This function exists to generate an analysis of budgeting using data aggregated from expense reports. More specifically, this report will include details such spending over the course of a specified duration, and the amount of manpower being utilized within certain areas of the organization.
        - Inputs

            - Request to generate budget analysis report
            - Authenticated user (only management and HR)
            - Historical timesheet data
            - Historical expense report data
            - Specified time period to analyze
            - Specified members of organization to analyze
        - Outputs
            - Report with aggregated correlation between expenses/timesheets against budget
        - Requirements
            - Access to data stores for timesheets and expense reports
        - Performers
            - Management
            - HR
        - Location
            - Human Resources department and general management
        - Pre-Conditions
            - Event("Request to generate budget analysis report") AND Authenticate(User) AND Query(Timesheets) AND Query(Expense Reports) OR (Input(Time period) OR Input(Member critera))
        - Post-Conditions
            - Generate(Budget Report)
- Employee training
    - Create training content
        - Description: All members of HR should have the ability to create training content for all employees to view. However, until the training content is formally submitted, it is only visible to HR.
        - Inputs
            - Request to create training content
            - Authenticated user (HR)
            - Training content
        - Output
            - Saved training content
        - Requirements: central data store with aggregated training content data
        - Performers: any employee belonging to HR
        - Location: Human resources department
        - Pre-Conditions
            - Event("Request to create training content") AND Authenticate(User) AND Input(Training content)
        - Post-Condition
            - Save(Training content)

- Query training content
    - Description: All HR personnel should have the ability to view training content they have created (applies to both archived and current training content). This function allows HR personnel to view any specific training content based on a search criteria.
    - Inputs
        - Request to fetch training content
        - Authenticated user (HR)
        - Search keywords
    - Outputs
        - Stored training content
    - Requirements: central data store with saved training content data
    - Performers: HR personnel
    - Location: Human resources department
    - Pre-Conditions
        - (Event("Request to fetch training content") AND Authenticate(User)) OR Input(Search keywords)
    - Post-Conditions
        - Get(Training content)
- Modify training content
    - Description: All HR personnel should have the ability to modify their own training content since additional changes may be required after creation of the content.
    - Inputs
        - Request to modify training content
        - Authenticated user (HR)
        - Training content to edit
        - Modified training content data
    - Outputs
        - Stored training content (modified)
    - Requirements: central data store with saved training content
    - Performers: HR
    - Location: Human resources department
    - Pre-Conditions
        - Event("Request to fetch timesheet") AND Authenticate(User) AND Query(Target training content) AND Input(Modified training content data)
    - Post-Conditions
        - Save(Training content)
- Submit training content
    - Description: All HR personnel can submit completed training content to be made available for all employees. Once training content is submitted, an email is sent to the

entire organization to alert them of the newly submitted content available for view. This email will request the employee to view the submitted training content.
    - Inputs
        - Request to submit Training content
        - Authenticated user (HR)
        - Training content to submit
    - Outputs
        - Email to target employees
        - Modified training content (indicates submitted state)
    - Requirements: central data store with saved and finalized training content data
    - Performers: HR personnel
    - Location: Human resources department
    - Pre-Conditions
        - Event("Request to submit training content") AND Authenticate(User) AND Query(Target training content)
    - Post-Conditions
        - Sent(Email to target employees) AND Save(Training content)
        - Save(Training content)
- Query training content (employee)
    - Description: All employees should have the ability to fetch training content they has been created and submitted by HR. This function allows any general employee to fetch a specific training content based on a search criteria.
    - Inputs
        - Request to fetch training content
        - Authenticated user (employee)
        - Search keywords
    - Outputs
        - Stored training content
    - Requirements: central data store with saved training content data
    - Performers: Employee
    - Location: Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - (Event("Request to fetch training content") AND Authenticate(User)) OR Input(Search keywords)
    - Post-Conditions
        - Get(Training content)
- View training content
    - Description: Once a particular training content has been queried, an employee can opt to view the content in

its entirety. This function ensures that upon completely viewing the training the content, it is marked as viewed for later tracking.
    - Inputs
        - Request to view training content
        - Authenticated user (employee)
        - Training content to be viewed
    - Outputs
        - Stored training content (marked as viewed)
    - Requirements
        - Central data store with saved training content data
    - Performers: General employee
    - Location
        - Any employee's cubicle (accessible to all employees)
    - Pre-Conditions
        - Event("Request to view training content") AND Authenticate(User) AND Query(Training content)
    - Post-Conditions
        - Viewed(Training content)
- Query viewed training content
    - Description: This function exists so that HR personnel can verify which specific training contents an employee has viewed. This allows HR to determine whether or not an employee has the qualifications to perform certain organizational duties. Additionally, if training content is pending viewership, this function can be used to send out a reminder email to the employee.
    - Inputs
        - Request to query viewed training content
        - Authenticated user (HR)
        - Employee to check
    - Outputs
        - Itemized list of training content and employee's viewership status of each
        - Reminder email to employee
    - Requirements
        - Central data store with saved training content data
    - Performers: HR personnel
    - Location
        - Human resources department
    - Pre-Conditions
        - Event("Request to query viewed training content") AND Authenticate(User) AND Input(Target user)
    - Post-Conditions
        - Fetch(List of unviewed training content) OR

(Sent(Email) AND Fetch(List of unviewed training content))

- Payroll
    - Calculate amount due to employee
        - Description: This function's purpose is to aggregate the data from an employee's profile, timesheets, expense reports, and performance evaluations to determine an appropriate pay amount for the pay period. This function mainly performs the numerical calculation of pay per week based on annual salary (or hourly rate), expenditures to be compensated, and bonuses to be paid out. This function should be automated and should only occur once per employee per pay period.
        - Inputs
            - Automated request to calculate amount due to employee (pay period)
            - User to be paid
        - Outputs
            - Dollar amount due to employee
        - Requirements
            - Access to compensation rules such bonus performance rates, tax rates, and benefits deductions
        - Performers: Accounting personnel
        - Location
            - Accounting department
        - Pre-Conditions
            - Query(User to be paid) AND Query(Timesheet of user to be paid) AND Query(Expense reports of user to be paid) AND Query(Performance evaluation of user to be paid)
        - Post-Conditions
            - Calculate(Amount to be paid)
    - Generate cheque/pay stub
        - Description: This function's purpose is to generate a record of the amount of money to be paid to the employee for payday. Either a physical check or pay stub is to be generated and delivered to the employee's mailing address (retrieved from employee's profile). A pay stub is always generated for the employee; however, a cheque is generated if the employee chose a direct deposit as his/her form of payment.
        - Inputs
            - Automated request to generate cheque/paystub
            - Employee to be paid
            - Amount due to employee

    - Outputs
        - Generated cheque
        - Generated pay stub
    - Requirements
        - Access to mailing system and special facilities for generate cheques
    - Performers: Accounting personnel
    - Location
        - Accounting department
    - Pre-Conditions
        - Query(Employee to be paid) AND Calculate(Amount to be paid)
    - Post-Conditions
        - Mail(Paystub) OR (Mail(Pay stub) AND Mail(Cheque))
- Deposit amount to bank
    - Description: This function's purpose is to directly deposit the amount to be paid to the employee to the employee's bank account (on file in the employee's profile)
    - Inputs
        - Automated request to deposit amount to bank
        - Employee to be paid
        - Amount due to employee
    - Outputs
        - Monetary deposit to bank
    - Requirements
        - Access to banking interface to deposit money external to system
    - Performers: Accounting personnel
    - Location
        - Accounting department
    - Pre-Conditions
        - Query(Employee to be paid) AND Calculate(Amount to be paid)
    - Post-Conditions
        - Pay(Employee's bank account)

1.4.2. Scenario Specifications

*Scenarios assume that the administration person / employee has already performed login and authentication as first steps in scenario specifications

ii. *Scenario* Pay Day:

1. Sequence of functions comprising of the scenario
    a. Approve time sheet -> Calculate amount due to employee -> deposit to bank account.

2. What environment is needed to execute the scenario?
    a. The payday time period is upcoming biweekly and all time sheets from employees have been processed
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - 2 days prior to payday verify that the time sheets for employees have been processed
    b. Completed (Post condition)
        - Employees have received checks or direct deposits and this is verified by payroll deparment.

iii. *Scenario New employee Joined and added to HR system.*

1. *Sequence of functions comprising of the scenario*
    a. *Authenticate user -> Add User -> Query-User-> Edit User*
2. What environment is needed to execute the scenario?
    a. Here it is a new employee has joined the company and HR is ready to register him/her. So a new user is added, query is made to check if the add was accurate and edit user if needed to correct the information of the new employee.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Eligible new employee has joined the company
    b. Completed (post condition)
        - Eligible new employee has been successfully be registered by the system and query of the employee is successfully verified.

iv. *Scenario Existing employee leaves: Deleting an employee who has left the company*

1. *Sequence of functions comprising of the scenario*
    a. *Authenticate user->Query-User-> Delete User*
2. What environment is needed to execute the scenario?
    a. Here it is a existing employee has left the company and HR is ready to delete him/her. So, an inquiry of the employees is done through a query and then that employee is deleted as a user of the system.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Eligible employee has left the company
    b. Completed (post condition)
        - Eligible old employee has been successfully be en deleted by the system and query of the employee is successfully verified as incorrect employee.

v. *Scenario Overtime payments:*

1. *Sequence of functions comprising of the scenario*
    a. *Add User HR-> Query-Time Sheet-> Calculate Amount due-> Verify the Payday*
2. What environment is needed to execute the scenario?
    a. Environment is that the employee seeking overtime has worked > 40 hrs a week.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Employee has some overtime hours to report in the time sheet
    b. Completed (post condition)
        - Employees have received a direct deposit to his/ her account

vi. *Scenario HR tracking trainings: HR to query the database and find out that the essential trainings for employee is taken. If not taken send a reminder and due date*

1. *Sequence of functions comprising of the scenario*
    a. *Query Viewed Training content-> Send Reminder email*
2. What environment is needed to execute the scenario?
    a. HR is in the process of querying which employees have and have not taken the trainings required
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - HR employee assigned to query training status
    b. Completed (post condition)
        - Reminder email sent to employees who have not taken the training.

vii. *Scenario Estimate project risk due to vacation: Management is able to pull up vacations of previous years for each employees in the group and plan on the coverage of areas during a high risk schedule project.*

1. *Sequence of functions comprising of the scenario*
    a. *Add User -> Query-User-> Edit User*
2. What environment is needed to execute the scenario?
    a. Here it is a new employee has joined the company and HR is ready to register him/her. So a new user is added, query is made to check if the add was accurate and edit user if needed to correct the information of the new employee.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Eligible new employee has joined the company
    b. Completed (post condition)

- Eligible new employee has been successfully be registered by the system and query of the employee is successfully verified.

viii. *Scenario Travel expenditure reimbursements : Employee is able to attach receipts for travel of domestic and international travels within 60 days. Management approves the expenses of travel, accommodation and meals. The employee receives the reimbursements by direct deposit to his default bank information in the system.*

1. *Sequence of functions comprising of the scenario*
    a. *Expense Tracking->Approve Expense report-> Send email*
2. What environment is needed to execute the scenario?
    a. Employee has returned from a business trip and is seeking travel reimbursements.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Employee returns for business trip
    b. Completed (post condition)
        - Employee receives an email that the expenses has been approve.
4. *Scenario Appraisals for employees: Manager does performance evaluation based on inputs entered by the employee.*
   Sequence of functions comprising of the scenario
    a. *Expense Tracking->Approve Expense report-> Send email*
5. What environment is needed to execute the scenario?
    a. Employee has returned from a business trip and is seeking travel reimbursements.
6. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Employee returns for business trip
    b. Completed (post condition)
        - Employee receives an email that the expenses has been approve.

ix. *Scenario: Employee Training Employee is able to search database for trainings in the co-operation. He/She is able to add a training course which is online or sign up for a training course which is on site in person in any location of the company. The system sends reminder for the courses to attend or cancel. If attended by employee the appropriate department is billed for the course. If not attended and cancelled on time no billing for the course. If not attended and not cancelled then bill the department for the no show.*

1. *Sequence of functions comprising of the scenario*
    a. *Query training content-> View Training content -> Query viewed training content -> Send Reminder email.*
2. What environment is needed to execute the scenario?

a. Employee wants to search the training database for accessing the trainings.

3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Employee searches in the training database
    b. Completed (post condition)
        - Reminder email is sent for the trainings to be done online.

x. *Scenario Resource Estimation: Project manager logs into the system and analyzes the headcount for the team in the next 2 years required for the project. The history of the headcount can be inquired for the last 2 years. Also headcount gaps can be inquired for each area and planning for hiring can be determined.*

Sequence of functions comprising of the scenario

a.

2. What environment is needed to execute the scenario?
    a. Employee has returned from a business trip and is seeking travel reimbursements.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Employee returns from business trip
    b. Completed (post condition)
        - Employee receives an email that the expenses has been approve.

xi. *Scenario Bonus Calculation and payout. Pay period for bonus identified. The bonus formula applied for each eligible employee. Eligible employees determined for the bonus period. The bonus formula made public to employees in the business update meeting. The paychecks for the bonus correspond to the next pay periods and the payments made by simple direct deposits.*

1. *Sequence of functions comprising of the scenario*
    a. *Calculate amount due to employee-> Verify Payday-> Deposit amount-> Send notification email.*
2. What environment is needed to execute the scenario?
    a. The bonus is calculated in the calculate amount due to the employee based on the merit of the employee and the revenue of the company.
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Company has announced revenue and also announced a bonus payout for the employee
    b. Completed (post condition)
        - Employees get the bonus amount and an email

notification is sent.

xii. Scenario Project Risk based on vacations: Vacation trend of employees analyzed and based on that trend of the project risk due to employees being out of office analyzed.

1. *Sequence of functions comprising of the scenario*
    a. *Query time sheet -> Generate budget analysis report*
2. What environment is needed to execute the scenario?
    a. The time for which each employee is out and the overlapping times for which other employees are out needs to be analyzed for project risks for previous projects
3. What triggers the execution of this scenario and what determines when it has completed (i.e., preconditions and post-conditions)?
    a. Trigger (precondition)
        - Project manager needs to analyze the vacation time affect in the organization and trend of the project risk from previous project data
    b. Completed (post condition)
        - Report is generated for analysis by management.

1.4.3. Essential Scenario

If you wanted to give someone a feel for the domain problem by selecting a *single* scenario, which one would you choose and why?

Scenario Pay Day: Calculate the amount due to the employee and then verify the pay date and disburse the amount to the employees bank account or through check.

Why? This is the scenario which the system must be able to perform as it is the main function of the human resource management system

1.5. Qualities and Constraints

1. Reliability of system
    a. Description: System should be robust and able to register new employee and correctly issue correct paychecks for all employees.
    b. Category: Performance
    c. Stakeholder source: Employee, HR
    d. Scope: Entire system
    e. Quality evaluation: The system should be reliably running 24/7 with downtime of only 5 min.

2. Security of the system and safeguard of employees' information
    a. Description: System should have security features like strong passwords for each user, encryption of personal information of the employee both personal information and information regarding performance should be securely stored.
    b. Category: Usability
    c. Stakeholder source: Employee, HR
    d. Scope: Entire system
    e. Quality evaluation: Encryption standards for data security should be followed to the highest quality level

3. Scalability of system so that the system can be deployed in larger or smaller systems

    a. Description: System should be scalable so that it could handle large number of employees and also more functions like handling recruiting of new employees.
    b. Category: Usability
    c. Stakeholder source: HR
    d. Scope: Adding new employee functions should be extended to job creating, evaluation of candidates, dis-positioning candidates
    e. Quality evaluation: Evaluate system for maximum employees of 10000 employees.
4. Maintainability
    a. Description: The system should be designed as such so as the code can be maintainable
    b. Category: Usability
    c. Stakeholder source: IT
    d. Scope: Entire system
    e. Quality evaluation: Ensure standard coding standard and ensure > 25 % comments in the code.

5. Testability
    a. Description: The system should have all the core features tested at lower and also @ system level
    b. Category: Usability
    c. Stakeholder source: IT
    d. Scope: Entire system
    e. Quality evaluation: Customer bug reports < 3 a month for non-critical bugs and <1 for critical bugs.
6. Modularity
    a. Description: The system should have all the modular to be integrated to other braoder systems
    b. Category: Usability
    c. Stakeholder source: IT
    d. Scope: Entire system
    e. Quality evaluation: All the components of the system evaluated to be plug and play compliant for reuse.

7. Extensibility
    a. Description: The system should have the ability to extend to other systems and components should be able to be dropped into the system.
    b. Category: Usability
    c. Stakeholder source: IT
    d. Scope: Entire system
    e. Quality evaluation: Evaluate the system has placeholder hooks to put in more modules and integrate those modules

8. Longevity
    a. Description: The system should be adequate enough to last a long time without any major changes to the core interface.
    b. Category: Usability
    c. Stakeholder source: Employees, HR,IT
    d. Scope: Entire system
    e. Quality evaluation: New changes introduced to the system should be evaluated for ROI
9. Marketability
    a. Description: The system developed should be marketable to other organizations.
    b. Category: Usability
    c. Stakeholder source: Employees, HR,IT
    d. Scope: Entire system
    e. Quality evaluation: Evaluate that core functions are implemented which every organization would need
10. Usability
    a. Description: The system developed should have an interface which is easy to use by employee and HR personal.
    b. Category: Usability
    c. Stakeholder source: Employees, HR, IT
    d. Scope: Entire system
    e. Quality evaluation: Feedback from users if the interface is easy and clearly documented to be used.

1.6. Deployment Environment

- One of the goals of designing a human resources management system is to distribute the effort required for HR tasks. As such, the system is designed as a comprehensive set of modules that all employees within the organization can utilized to accomplish HR's goals. Due to this requirement of universal access, the system will be deployed as a web application. As a web application, the system is ensured accessibility and availability across the entire organization.
    - Stakeholder source: All internal business users need to be able to access the system, HR department, and management.

- The crux of this web application is the centralized data store required to record and read data such as employee information, timesheets, expense reports, performance evaluations, and training materials. This amount of information being stored will be proportional to the size of the organization. As this system is being targeted towards large-sized organization, it is integral that the deployment environment can handle such large amount of information. In this case, it is desired to use a reliable and scalable database back-end designed with enterprise standards in mind (high performance, high throughput, redundancy, and replication abilities). Use of enterprise standards ensures that the system will more closely align with typical IT department guidelines, and will make it easier for IT departments to develop against the system (in case there's a need to extend the system).
    - Stakeholder source: businesses as customers, IT departments and developers
- Performance of the system is extremely critical as all employees in a large organization will be accessing this system. A large number of those users may access the system simultaneous; consequently, latency becomes a concern. The deployment environment will address this concern using load balancing across multiple servers. These servers should be datacenter-ready machines with a large amount of disk space for the database and a large amount of processing power available to handle a large amount of requests.
    - Stakeholder source: All internal business users need to be able to access the system, HR department, and management department.
- Moreover, a web-based enterprise system of this scale requires an optimal connection to the organization intranet. It is expected this system will reside in a datacenter with dedicated connections to a reliable internet backbone.
    - Stakeholder source: All internal business users need to be able to access the system.
- This system is being designed as a generic solution sold to large businesses. As such distribution of this system must be kept as easy as possible and configuration should be as minimal as possible. To accommodate these requirements, it may be best to distribute this system as an appliance. In this possible scenario, there is no need for a customer to configure a web server and the web application separately. In essence, the system should be delivered as the entire stack rather than just a web application. As an appliance, it is desired to keep the stack was minimal as possible since resources will be constrained. To accomplish this, it is best to use a software stack based off Linux or a BSD derivative as the kernel can be tuned towards an appliance environment.
    - Stakeholder source: Marketing (easier to sell a solution based on simple deployment), IT departments and developers (easier to install and deploy for their respective business)
- Since web application will have to handle a large amount of requests (since it accommodates all employees in an organization), scalability is a very important consideration. In terms of a web application, it is best to use web technologies based off Java Platform (Enterprise Edition) due to its compiled nature and its tried and tested usage in the enterprise. Furthermore, Java, being an ubiquitous platform in the enterprise market, will prove to be more maintainable than other technologies due to the number of already experienced developers that are in the industry.

    - Stakeholder source: IT departments and developers (ease of development)
- In terms of implementation, the system should be designed with tried and tested design patterns used conventionally in Java. Technologies such as JavaBeans and Servlets should be leveraged in order to stay within enterprise standards.
    - Stakeholder source: IT departments and developers (ease of development)