

Payroll Management System

Bryan Fetner

Student ID: 920822900

Github Username: bfetner

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I: Project Description

For any company, payroll management can be a challenge. Errors and mismanagement of payroll can lead to many problems, from disgruntled employees, to lost productivity, and even conflict with tax agencies. To alleviate these issues, many have developed software to handle and streamline this process. We also want to offer this service with our own Payment Management System. You may be asking yourself, why just make something that is already available? Though other products offer smooth employee payroll services, not only will we offer the same service, but we also offer the streamlining of any changes to tax laws and benefit regulations that pertain to any particular company. This upgrade will allow for less error and conflict with the local governments.

Our Payroll Management System will have many features to offer in order to facilitate the smooth operation of handling employee payroll. We will maintain a continuous record of all past employee history, which includes previous employees, for any future need. We will automatically calculate the employee pay, deductions, and also what the company may own as a result of payroll taxes. We will generate the pay stubs and checks for payday. We will even automate sending the direct deposit payment to employee accounts. We will generate the tax forms needed for employees and employers alike, removing that hassle off your hands. And we offer an automatic notification and approval system to apply any new government compliances that pertain to company payroll.

Our goal is to provide a service and a system that companies can rely on. A flexible and growing system that will adjust to any changes that need to be met. A system that will manage all employees time and pay, and maintain a record of all necessary information. An automated system that will simplify the process of generating necessary forms. All in the effort to make payroll not only easy, but more reliable. Because a disruption in payroll is a disruption in productivity, and a disruption in productivity is a disruption in profits.

II: Use Cases

Title:	Adding new hire to system
Actors:	Sandra (New business owner), Jeff (First employee)
Description:	<p>Sandra just started a new business. With the prospect of her hiring her first employee she starts a new account on the Payment Management System. With this account she inputs her company's information, and thereafter adds the information for her first employee, Jeff. The system allows Sandra to easily input Jeff's information such as his address and his phone number, along with a job title that is either already in the system or she can make a custom one. The system provides her easy access to the available benefits that she can offer, or that is required to offer by the city of San Francisco for which her company is based. Sandra can now set Jeff's benefits and wage setting him up to have his hours recorded giving Sandra confidence that the upcoming payroll will go smoothly.</p>

Title:	Gathering employee paychecks
Actors:	Taylor (Payroll clerk)
Description:	<p>Taylor is a payroll clerk at a small company. Every two weeks he uses the Payroll Management System to compute all the employees pay using the recorded hours and their pay wages to determine their gross pay. Afterwards the system calculates deductions from the various employee benefits including the required standard deductions. From here he can print out the pay stubs for all the employees as well as their paychecks. Or, if they opted for direct deposit, Taylor can use the system to route the money directly to their accounts.</p>

Title:	Managing requested vacation days
Actors:	Max (Department manager), Irene (Employee in need of a vacation)
Description:	Irene is planning a trip to Hawaii that will take up several work days. In preparation for this trip she makes a request to her department manager, Max, to use several vacation days on the specific dates for her trip. Max agrees with Irene's vacation request and submits this in the Payroll Management System. The days Irene is taking for her vacation are recorded in the system, so then when payday comes around they will be automatically applied to her pay. She can enjoy her vacation without the worry of financial irregularity.

Title:	Adjusting pay and benefits for employee promotion
Actors:	Justine (Payroll clerk), Kimberly (Promoted employee)
Description:	After many years working at her company, Kimberly finally gets the much deserved promotion she was working towards. This promotion netted her an increased salary pay, increased vacation days, and extra health benefits. With this news, Justine in the payroll department makes the appropriate changes to Kimberly's account. Her current salary and benefits are updated, also the history feature automatically stores Kimberly's previous salary and benefits for possible future reference.

Title:	Employee leaving company
Actors:	Manny (Payroll clerk), Garth (Exiting employee)
Description:	After several months, Garth decided that working at his company was not a good fit for him. He then gives his manager the expected two weeks notice. His manager forwards this information to Manny in the payroll department. Manny can now prepare for Garth's departure by changing his employee status. And though Garth will no longer be an employee, all his information will remain in the system for future reference and tax needs. The Payroll Management System also gives Manny the documentation needed for Garth's final payroll.

Title:	Applying new and adjusted deductions to employees pay
Actors:	Cedric (Payroll clerk)
Description:	Cedric receives a notification from the Payment Management System when he enters work one day. The notification indicates that there are new statewide changes regarding sick leave for employees. In order to comply with these new regulations, Cedric simply uses the system's automated tool to update everyone's minimum sick leave to meet with the new requirements.

Title:	Income tax season
Actors:	Harvey (Payroll clerk)
Description:	The year has just turned over and it is time for Harvey to prepare W-2 forms for all the employees in the company. This process is made easy with the Payment Management System. The system gathers all the information from all the employees, calculates their net pay, their deductions, how much of the deductions went towards taxes and their gross pay. From this the system then generates all the W-2 forms for Harvey to print out and distribute.

Title:	Handling Company Taxes
Actors:	Tammy (Company Owner)
Description:	Every quarter Tammy must submit her corporate tax forms. The Payroll Management System helps with this as it gathers all the information needed regarding her employees payroll taxes. The system then tallies everything up and prepares the documents for Tammy to print out. All that's left for her to do is sign the check and mail it out.

Title:	Contacting support
Actors:	Eric (Payroll clerk)
Description:	First thing in the morning, Eric attempts to log in to the Payroll Management System, but for some reason his password isn't working. He gives it a few more tries and then finds himself locked out of the account. Frustrated, Eric fills out the support form to contact customer support. He quickly receives an email from them recommending him to use the live chat support for quicker communication. Eric does so, requesting a session for live chat. A support technician responds, and after asking Eric some key information about the account the technician unlocks it and resets the password. Relieved, Eric can start his work day.

Title:	Generating a report
Actors:	Trish(Company President), Gus (Payroll clerk)
Description:	Gus in the payroll department just received a request from the president of the company, Trish, for a report on the last quarter of payroll. Using the Payroll Management System, Gus can choose to generate a report that gives all details on employee pay for the last quarter. As well, he chooses an appealing and readable design and color scheme that also match the company's brand. Gus then prints out the report and brings it to Trish's office to her delight.

III: Database Requirements

1. Device
 - 1.1. A device shall be able to have a session with many users
 - 1.2. A device shall have an id
 - 1.3. A device shall have a description
 - 1.4. A device shall be able to log into only one account
2. User
 - 2.1. A user shall be able to create one account using an unique email
 - 2.2. A user shall be able to have a session with many devices
 - 2.3. A user shall be able to have many mail support
 - 2.4. A user shall be able to have many live chat support
 - 2.5. A user shall have an email
 - 2.6. A user shall have a first name
 - 2.7. A user shall have a last name
3. Account
 - 3.1. An account shall have one and only one user
 - 3.2. An account shall be logged into from at least one device
 - 3.3. An account shall have an account password
 - 3.4. An account shall have at least one company
 - 3.5. An account shall have a creation date
4. Company
 - 4.1. A company shall be accessible from one account
 - 4.2. A company shall be able to have many employees
 - 4.3. A company shall be able to have many departments
 - 4.4. A company shall have at least one region
 - 4.5. A company shall have at least one payment method
 - 4.6. A company shall have at least one history
 - 4.7. A company shall be able to track many used paid time off
 - 4.8. A company shall be able to distribute many employee tax documents
 - 4.9. A company shall be able to distribute many employee pay
 - 4.10. A company shall be able to have many payroll compliances
 - 4.11. A company shall be able to have many reports
 - 4.12. A company shall have a name
 - 4.13. A company shall have a type

5. Person
 - 5.1. A person is either an employee or not an employee
 - 5.2. A person shall be able to have many used paid time off
 - 5.3. A person shall be able to have many employee pay
 - 5.4. A person shall be able to have many time worked
 - 5.5. A person shall be able to have many histories
 - 5.6. A person shall have a first name
 - 5.7. A person shall have a last name
 - 5.8. A person shall have at least one address
 - 5.9. A person shall have at least one phone number
 - 5.10. A person shall be able to have many tax documents
 - 5.11. A person shall have one and only one SSN
6. Employee
 - 6.1. An employee shall work for at least one company
 - 6.2. An employee shall work in at least one department
 - 6.3. An employee shall be able to have at least one job title
 - 6.4. An employee is a type of person
 - 6.5. An employee is either a hourly employee or a salary employee
 - 6.6. An employee shall be able to have at least one benefit
 - 6.7. An employee shall be able to have at least one standard deduction
 - 6.8. An employee shall use one payment method
 - 6.9. An employee shall have vacation time in days
 - 6.10. An employee shall have sick leave in days
7. Previous Employee
 - 7.1. A previous employee is a type of person
 - 7.2. A previous employee shall have a leave date
 - 7.3. A previous employee shall have a exit description
8. Manager
 - 8.1. A manager is a recurring employee
 - 8.2. A manager shall manage at least one department
 - 8.3. A manager shall have a management start date
 - 8.4. A manager shall have a management role
9. Department
 - 9.1. A department shall have at least one manager
 - 9.2. A department shall have at least one employee
 - 9.3. A department belongs to one company
 - 9.4. A department shall have a name
 - 9.5. A department shall have a description

10. Address
 - 10.1. An address shall belong to at least one employee
 - 10.2. An address shall have a street address
 - 10.3. An address shall have a city
 - 10.4. An address shall have a state
 - 10.5. An address shall have a zip code
11. Phone Number
 - 11.1. A phone number shall belong to one employee
 - 11.2. A phone number shall have a country code
 - 11.3. A phone number shall have a area code
 - 11.4. A phone number shall have a telephone number
12. Job Title
 - 12.1. A job title shall be able to belong to many employees
 - 12.2. A job title shall have a name
 - 12.3. A job title shall have a description
13. Region
 - 13.1. A region shall have at least one deduction
 - 13.2. A region shall be able to have many companies
 - 13.3. A region shall be able to assign many payroll compliances
 - 13.4. A region shall have at least one company tax
 - 13.5. A region shall have a name
 - 13.6. A region shall have a type
14. Time worked
 - 14.1. A time worked shall be assigned to one person
 - 14.2. A time worked shall be at one company
 - 14.3. A time worked shall have a start date
 - 14.4. A time worked shall have a start time
 - 14.5. A time worked shall have an end date
 - 14.6. A time worked shall have an end time
15. Hourly Employee
 - 15.1. A hourly employee is a type of employee
 - 15.2. A hourly employee shall have a hourly wage pay amount
 - 15.3. A hourly employee shall have a wage last changed date
16. Salary Employee
 - 16.1. A salary employee is a type of employee
 - 16.2. A salary employee shall have a salary pay amount
 - 16.3. A salary employee shall have a salary late changed date

17. Benefit
 - 17.1. A benefit shall be offered by a company
 - 17.2. A benefit shall be able to be given to many employees
 - 17.3. A benefit shall have a type
 - 17.4. A benefit shall have a description
 - 17.5. A benefit shall have a cost
18. Standard Deduction
 - 18.1. A standard deduction shall be given to many employees
 - 18.2. A standard deduction shall belong to at least one region
 - 18.3. A standard deduction shall have a type
 - 18.4. A standard deduction shall have a description
 - 18.5. A standard deduction shall have a cost
19. Payment Method
 - 19.1. A payment method is offered by at least one company
 - 19.2. A payment method shall be able to be used by many employee payments
 - 19.3. A payment method is either a check or a direct deposit
 - 19.4. A payment method shall have a type
 - 19.5. A payment method shall have a description
20. Check
 - 20.1. A check is a type of payment method
 - 20.2. A check shall have a check number
 - 20.3. A check shall have a bank name
 - 20.4. A check shall have a signed by
 - 20.5. A check shall have an account number
21. Direct Deposit
 - 21.1. A direct deposit is a type of payment method
 - 21.2. A direct deposit shall have a bank name
 - 21.3. A direct deposit shall have an account number
 - 21.4. A direct deposit shall have a routing number
22. Employee Pay
 - 22.1. A employee pay shall belong to one person
 - 22.2. A employee pay shall use at least one pay method
 - 22.3. A employee pay has an amount
 - 22.4. A employee pay has a date

- 23. History
 - 23.1. A wage history shall belong to one person
 - 23.2. A wage history shall belong to one company
 - 23.3. A history is either a wage history or a benefit history
 - 23.4. A history shall have a started date
 - 23.5. A history shall have a ended date
- 24. Wage History
 - 24.1. A wage history is a type of history
 - 24.2. A wage history shall have a type of wage
 - 24.3. A wage history shall have a wage amount
- 25. Benefit History
 - 25.1. A benefit history is a type of history
 - 25.2. A benefit history shall have a type of benefit
 - 25.3. A benefit history shall have a description
 - 25.4. A benefit history shall have a deduction amount
- 26. Used Paid Time Off
 - 26.1. A used paid time off shall belong to one person
 - 26.2. A used paid time off shall belong to one company
 - 26.3. A used paid time off shall have a type
 - 26.4. A used paid time off shall have a description
 - 26.5. A used paid time off shall have a date
- 27. Company Tax
 - 27.1. A company tax shall belongs to one company
 - 27.2. A company tax shall belongs to one region
 - 27.3. A company tax shall have a type
 - 27.4. A company tax shall have a description
 - 27.5. A company tax shall have a due date
 - 27.6. A company tax shall have a dollar amount
 - 27.7. A company tax shall have a paid marker
- 28. Employee Tax Document
 - 28.1. An employee tax shall belong to one person
 - 28.2. An employee tax document shall be distributed by one company
 - 28.3. An employee tax document shall have a form type
 - 28.4. An employee tax document shall have a description
 - 28.5. An employee tax document shall have a date distributed

- 29. Payroll Compliance
 - 29.1. A payroll compliance shall belong to one company
 - 29.2. A payroll compliance shall be given by one region
 - 29.3. A payroll compliance shall have a type
 - 29.4. A payroll compliance shall have a description
 - 29.5. A payroll compliance shall have and implementation date
- 30. Email Support
 - 30.1. An email support shall be able to generate many email support requests
 - 30.2. An email support shall have a general topic
 - 30.3. An email support shall have a support department
- 31. Email Support Request
 - 31.1. An email support request shall belong to one and only one user
 - 31.2. An email support request shall be generated by one email support
 - 31.3. An email support request shall have a subject
 - 31.4. An email support request shall have a content
 - 31.5. An email support request shall have a support contact
 - 31.6. An email support request shall have a date submitted
 - 31.7. An email support request shall have a time submitted
 - 31.8. An email support request shall have a user email
- 32. Live Chat Support
 - 32.1. A live chat support shall be able to generate many live chat support requests
 - 32.2. A live chat support shall have a general topic
 - 32.3. A live chat support shall have a support department
- 33. Live Chat Support Request
 - 33.1. A live chat support request shall belong to one and only one user
 - 33.2. A live chat support request shall be generated by one live chat support
 - 33.3. A live chat support request shall have a subject
 - 33.4. A live chat support request shall have a date
 - 33.5. A live chat support request shall have a start time
 - 33.6. A live chat support request shall have a end time
 - 33.7. A live chat support request shall have a live agent
- 34. Report
 - 34.1. A report shall belong to one and only one company
 - 34.2. A report shall use one report option
 - 34.3. A report shall have a title
 - 34.4. A report shall have a author
 - 34.5. A report shall have a description
 - 34.6. A report shall have a date

- 35. Report Option
 - 35.1. A report option shall be able to belong to many reports
 - 35.2. A report option shall be able to be used by many reports
 - 35.3. A report option shall have a type
 - 35.4. A report option shall have a design
 - 35.5. A report option shall have a color scheme

IV: Detailed List of Main Entities

1. Device: Strong
 - 1.1. device_id: key, numeric
 - 1.2. account_id: weak key, numeric
 - 1.3. device_name: composite, alphanumeric
 - 1.4. device_type: composite, alphanumeric
2. Session: Weak
 - 2.1. session_id: key, numeric
 - 2.2. device_id: weak key, numeric
 - 2.3. user_id: weak key, numeric
 - 2.4. start_time: composite, time
3. User: Strong
 - 3.1. user_id: key, numeric
 - 3.2. account_id: weak key, numeric
 - 3.3. first_name: alphanumeric
 - 3.4. last_name: alphanumeric
 - 3.5. email: alphanumeric
4. Account: Weak
 - 4.1. account_id: key, numeric
 - 4.2. password: alphanumeric
 - 4.3. created: composite, date
5. Company: Strong
 - 5.1. company_id: key, numeric
 - 5.2. account_id: weak key, numeric
 - 5.3. name: alphanumeric
 - 5.4. type: alphanumeric
6. Company Supported Payment Methods: Weak
 - 6.1. comp_pay_methods_id: key, numeric
 - 6.2. company_id: weak key, numeric
 - 6.3. pay_method_id: weak key, numeric
7. Company Employees: Weak
 - 7.1. comp_emp_id: key, numeric
 - 7.2. company_id: weak key, numeric
 - 7.3. employee_id: weak key, numeric

- 8. Company Offered Benefits: Weak
 - 8.1. comp_offered_bene_id: key, numeric
 - 8.2. company_id: weak key, numeric
 - 8.3. benefit_id: weak key, numeric
- 9. Company Region: Weak
 - 9.1. comp_region_id: key, numeric
 - 9.2. company_id: weak key, numeric
 - 9.3. region_id: weak key, numeric
- 10. Company Compliances: Weak
 - 10.1. comp_compliances_id: key, numeric
 - 10.2. company_id: weak key, numeric
 - 10.3. payroll_compliance_id: weak key, numeric
- 11. Person: Strong
 - 11.1. ssn: key, numeric
 - 11.2. isa_type: alphanumeric
 - 11.3. first name: alphanumeric
 - 11.4. last name: alphanumeric
 - 11.5. email: alphanumeric
- 12. Employee: Weak
 - 12.1. employee_id: key, numeric
 - 12.2. ssn: weak key, numeric
 - 12.3. isa_type: alphanumeric
 - 12.4. start_work_date: composite, date
 - 12.5. vacation_days: numeric
 - 12.6. sick_days: numeric
- 13. Employee Job Titles: Weak
 - 13.1. emp_job_titles_id: key, numeric
 - 13.2. employee_id: weak key, numeric
 - 13.3. job_title_id: weak key, numeric
- 14. Employee Benefits: Weak
 - 14.1. emp_bene_id: key, numeric
 - 14.2. employee_id: weak key, numeric
 - 14.3. benefit_id: weak key, numeric

- 15. Employee Standard Deductions: Weak
 - 15.1. emp_stand_deduct_id: key, numeric
 - 15.2. employee_id: weak key, numeric
 - 15.3. standard_deduction_id: weak key, numeric
- 16. Previous Employee: Weak
 - 16.1. pre_emp_id: key, numeric
 - 16.2. ssn: weak key, numeric
 - 16.3. leave_date: composite, date
 - 16.4. exit_description: alphanumeric
- 17. Manager: Weak
 - 17.1. manager_id: key, numeric
 - 17.2. employee_id: weak key, numeric
 - 17.3. man_start_date: composite, date
 - 17.4. man_role: alphanumeric
- 18. Department: Weak
 - 18.1. depart_id: key, numeric
 - 18.2. company_id: weak key, numeric
 - 18.3. name: alphanumeric
 - 18.4. description: alphanumeric
- 19. Managing in Departments: Weak
 - 19.1. man_in_depart_id: key, numeric
 - 19.2. manager_id: weak key, numeric
 - 19.3. depart_id: weak key, numeric
- 20. Employees in Departments: Weak
 - 20.1. emp_in_depart_id: key, numeric
 - 20.2. employee_id: weak key, numeric
 - 20.3. depart_id: weak key, numeric
- 21. Address: Strong
 - 21.1. address_id: key, numeric
 - 21.2. ssn: weak key, numeric
 - 21.3. street_address: composite, alphanumeric
 - 21.4. city: composite, alphanumeric
 - 21.5. state: alphanumeric
 - 21.6. zip_code: numeric

- 22. Phone Number: Strong
 - 22.1. phone_number_id: key, numeric
 - 22.2. ssn: weak key, numeric
 - 22.3. country_code: numeric
 - 22.4. area_code: numeric
 - 22.5. telephone_number: numeric
- 23. Job Title: Strong
 - 23.1. job_title_id: key, numeric
 - 23.2. name: alphanumeric
 - 23.3. description: alphanumeric
- 24. Region: Strong
 - 24.1. region_id: key, numeric
 - 24.2. name: composite, alphanumeric
 - 24.3. type: composite, alphanumeric
- 25. Regional Standard Deductions: Weak
 - 25.1. reg_stand_deduct_id: key, numeric
 - 25.2. standard_deduction_id: weak key, numeric
 - 25.3. region_id: weak key, numeric
- 26. Time Worked: Weak
 - 26.1. time_worked_id: key, numeric
 - 26.2. ssn: weak key, numeric
 - 26.3. company_id: weak key, numeric
 - 26.4. start_date: composite, date
 - 26.5. end_date: composite, date
 - 26.6. start_time: composite, time
 - 26.7. end_time: composite, time
- 27. Hourly Employee: Weak
 - 27.1. hourly_emp_id: key, numeric
 - 27.2. employee_id: weak key, numeric
 - 27.3. hourly_wage: numeric
 - 27.4. wage_last_changed: composite, date
- 28. Salary Employee: Weak
 - 28.1. salary_emp_id: key, numeric
 - 28.2. employee_id: weak key, numeric
 - 28.3. salary_pay: numeric
 - 28.4. salary_last_changed: composite, date

- 29. Benefit: Strong
 - 29.1. benefit_id: key, numeric
 - 29.2. type: alphanumeric
 - 29.3. description: alphanumeric
 - 29.4. cost: numeric
- 30. Standard Deduction: Strong
 - 30.1. standard_deduction_id: key, numeric
 - 30.2. type: alphanumeric
 - 30.3. description: alphanumeric
 - 30.4. cost: numeric
- 31. Payment Method: Strong
 - 31.1. pay_method_id: key, numeric
 - 31.2. isa_type: alphanumeric
 - 31.3. description: alphanumeric
- 32. Payroll Payment Methods: Weak
 - 32.1. payroll_pay_methods_id: key, numeric
 - 32.2. employee_pay_id: weak key, numeric
 - 32.3. pay_method_id: key, numeric
- 33. Check: Weak
 - 33.1. check_id: key, numeric
 - 33.2. pay_method_id: weak key, numeric
 - 33.3. check_number: numeric
 - 33.4. bank_name: alphanumeric
 - 33.5. signed_by: alphanumeric
 - 33.6. account_number: numeric
- 34. Direct Deposit: Weak
 - 34.1. direct_deposit_id: key, numeric
 - 34.2. pay_method_id: weak key, numeric
 - 34.3. bank_name: alphanumeric
 - 34.4. account_number: numeric
 - 34.5. routing_number: numeric
- 35. Employee Pay: Weak
 - 35.1. emp_pay_id: key, numeric
 - 35.2. ssn: weak key, numeric
 - 35.3. company_id: weak key, numeric
 - 35.4. amount: numeric
 - 35.5. date: composite, date

- 36. History: Weak
 - 36.1. hist_id: key, numeric
 - 36.2. ssn: weak key, numeric
 - 36.3. company_id: weak key, numeric
 - 36.4. isa_type: alphanumeric
 - 36.5. starting_date: composite, date
 - 36.6. ending_date: composite, date
- 37. Wage History: Weak
 - 37.1. wage_hist_id: key, numeric
 - 37.2. hist_id: weak key, numeric
 - 37.3. type_of_wage: alphanumeric
 - 37.4. wage_amount: numeric
- 38. Benefit History: Weak
 - 38.1. benefit_hist_id: key, numeric
 - 38.2. hist_id: weak key, numeric
 - 38.3. type_of_benefit: alphanumeric
 - 38.4. benefit_description: alphanumeric
 - 38.5. deduction_amount: numeric
- 39. Used Paid Time Off: Weak
 - 39.1. paid_time_off_id: key, numeric
 - 39.2. ssn: weak key, numeric
 - 39.3. company_id: weak key, numeric
 - 39.4. type: alphanumeric
 - 39.5. description: alphanumeric
 - 39.6. date: composite, date
- 40. Company Tax: Strong
 - 40.1. company_tax_id: key, numeric
 - 40.2. company_id: weak key, numeric
 - 40.3. region_id: weak key, numeric
 - 40.4. type: alphanumeric
 - 40.5. description: alphanumeric
 - 40.6. due_date: composite, date
 - 40.7. dollar_amount: numeric
 - 40.8. paid: boolean

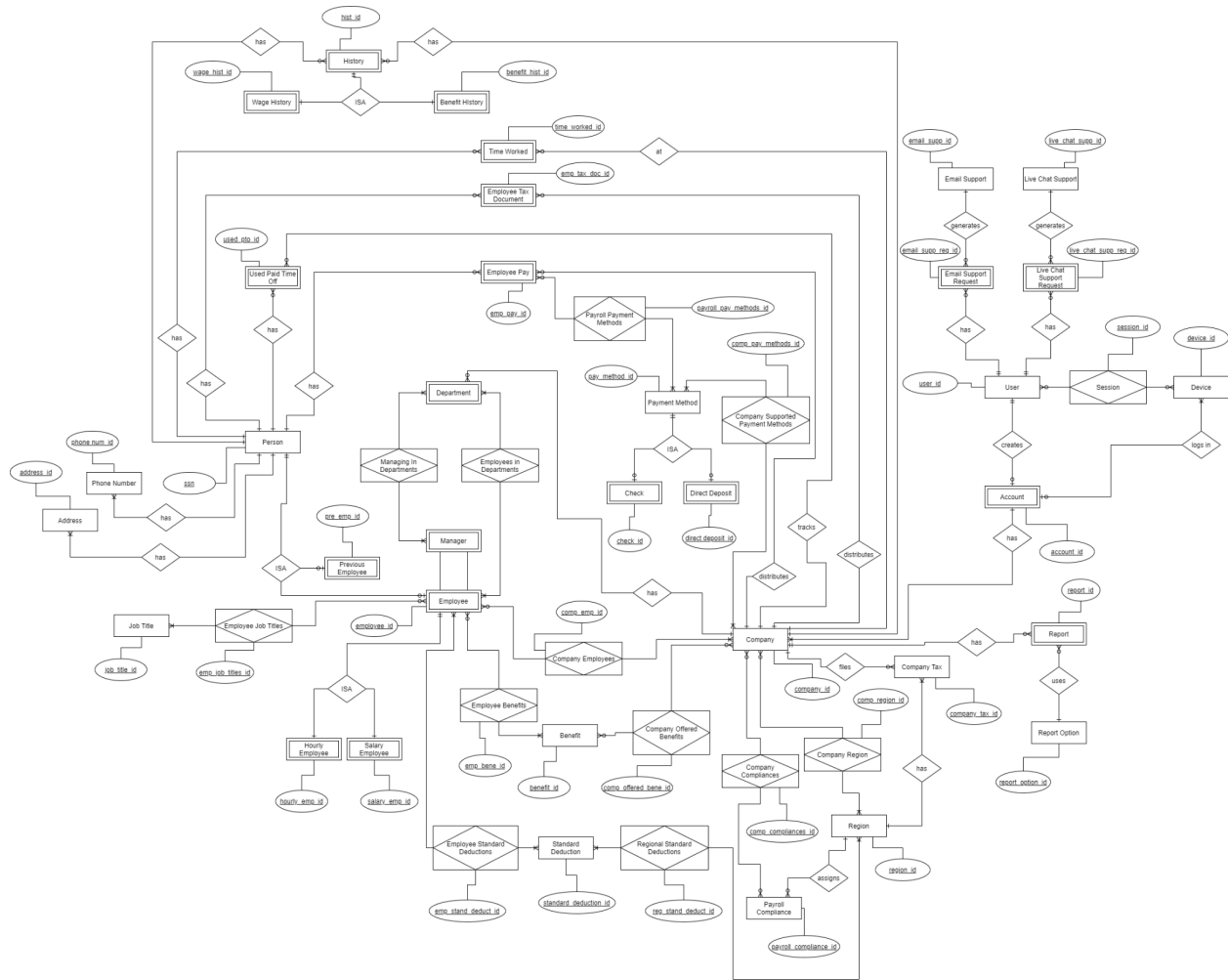
- 41. Employee Tax Document: Weak
 - 41.1. emp_tax_doc_id: key, numeric
 - 41.2. ssn: weak key, numeric
 - 41.3. company_id: weak key, numeric
 - 41.4. form_type: alphanumeric
 - 41.5. description: alphanumeric
 - 41.6. date_distrubuted: composite, date
- 42. Payroll Compliance: Strong
 - 42.1. payroll_compliance_id: key, numeric
 - 42.2. region_id: weak key, numeric
 - 42.3. type: alphanumeric
 - 42.4. description: alphanumeric
 - 42.5. implementation_date: composite, date
- 43. Email Support: Strong
 - 43.1. email_supp_id: key, numeric
 - 43.2. topic: alphanumeric
 - 43.3. department: alphanumeric
- 44. Email Support Request: Weak
 - 44.1. email_supp_req_id: key, numeric
 - 44.2. email_supp_id: weak key, numeric
 - 44.3. user_id: weak key, numeric
 - 44.4. subject: alphanumeric
 - 44.5. content: alphanumeric
 - 44.6. contact: alphanumeric
 - 44.7. date: composite, date
 - 44.8. time: composite, time
 - 44.9. email: alphanumeric
- 45. Live Chat Support: Strong
 - 45.1. live_chat_supp_id: key, numeric
 - 45.2. topic: alphanumeric
 - 45.3. department: alphanumeric

- 46. Live Chat Support Request: Weak
 - 46.1. live_chat_supp_req_id: key, numeric
 - 46.2. live_chat_supp_id: weak key, numeric
 - 46.3. user_id: weak key, numeric
 - 46.4. subject: alphanumeric
 - 46.5. date: composite, date
 - 46.6. start_time: composite, time
 - 46.7. end_time: composite, time
 - 46.8. agent: alphanumeric

- 47. Report: Weak
 - 47.1. report_id: key, numeric
 - 47.2. company_id: weak key, numeric
 - 47.3. report_option_id: weak key, numeric
 - 47.4. title: alphanumeric
 - 47.5. author: alphanumeric
 - 47.6. description: alphanumeric
 - 47.7. date: composite, date

- 48. Report Option: Strong
 - 48.1. report_option_id: key, numeric
 - 48.2. type: alphanumeric
 - 48.3. design: alphanumeric
 - 48.4. color_scheme: alphanumeric

V: Entity Relationship Diagram



VI: Testing Table/ERD

Rule	Entity A	Relation	Entity B	Cardinality	Pass/Fail	Error Description
1	Device	Logs In	Account	M-to-1	Pass	
2	Device	Session	User	M-to-M	Pass	
3	User	Creates	Account	1-to-1	Pass	
4	Account	Has	Company	1-to-M	Pass	
5	Company	Files	Company Tax	1-to-M	Pass	
6	Company	Company Region	Region	M-to-M	Pass	
7	Company	Has	Payroll Compliance	1-to-M	Fail	A payroll compliance can apply to many companies
8	Company	Has	History	1-to-M	Pass	
9	Company	Company Offered Benefits	Benefit	M-to-M	Pass	
10	Time Worked	At	Company	M-to-1	Pass	
11	Employee	Company Employees	Company	M-to-M	Pass	
12	Company	Company Supported Payment Methods	Payment Method	M-to-M	Pass	
13	Company	Tracks	Used Paid Time Off	1-to-M	Pass	
14	Company	Distributes	Employee Tax Document	1-to-M	Pass	
15	Person	Has	Used Paid Time Off	1-to-M	Pass	
16	Person	Has	Pay	1-to-M	Fail	Payroll should be distributed by the company

17	Person	Has	Phone Number	1-to-M	Pass	
18	Person	Has	Address	1-to-M	Pass	
19	Person	ISA	Employee	1-to-1	Pass	
20	Person	ISA	Previous Employee	1-to-1	Pass	
21	Person	Has	Employee Tax Document	1-to-M	Fail	Employee Tax Document is fully dependant on Person and Company
22	Employee	Employee Job Titles	Job Title	M-to-M	Pass	
23	Employee	Uses	Payment Method	1-to-1	Pass	
24	Employee	Has	Time Worked	M-to-1	Fail	Employee won't always have a time worked, and time worked is fully dependant on employee and company, making it a weak entity
25	Employee	Employee Benefits	Benefit	M-to-M	Pass	
26	Employee	Has	History	1-to-M	Fail	Employee won't necessarily have a history, and history is dependant on employee and company, so it can't be strong
27	Employee	Employee Standard Deduction	Standard Deduction	M-to-M	Pass	
28	Employee	ISA	Hourly Employee	1-to-1	Pass	
29	Employee	ISA	Salary Employee	1-to-1	Pass	
30	Manager	Recursive	Employee		Pass	

31	Manager	Managing in Departments	Departments	M-to-M	Fail	A manager should be able to manage more than one department
32	Employee	Employees in Departments	Departments	M-to-M	Fail	Allowing zero employees makes department both strong and weak
33	Company	has	Departments	1-to-M	Pass	
34	Region	Regional Standard Deductions	Standard Deduction	M-to-M	Pass	
35	Region	Has	Company Tax	1-to-1	Fail	A region can have multiple company taxations
36	Region	Assigns	Payroll Compliance	1-to-M	True	
37	Payment Method	Payroll Payment Methods	Payroll	M-to-M	Pass	
38	Payment Method	ISA	Check	1-to-1	Pass	
39	Payment Method	ISA	Direct Deposit	1-to-1	Pass	
40	History	ISA	Wage History	1-to-1	Pass	
41	History	ISA	Benefit History	1-to1	Pass	
42	Email Support	Generates	Email Support Request	1-to-M	Pass	
43	User	Has	Email Support Request	1-to-M	Pass	
44	Live Chat Support	Generates	Live Chat Support Request	1-to-M	Pass	
45	User	Has	Live Chat Support	1-to-M	Pass	
46	Company	Has	Report	1-to-M	Pass	

47	Report	Uses	Report Option	M-to-1	Fail	A report option might not be used by any reports, so it only needs to be able to be used by a report.
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VII: Database Model/EER

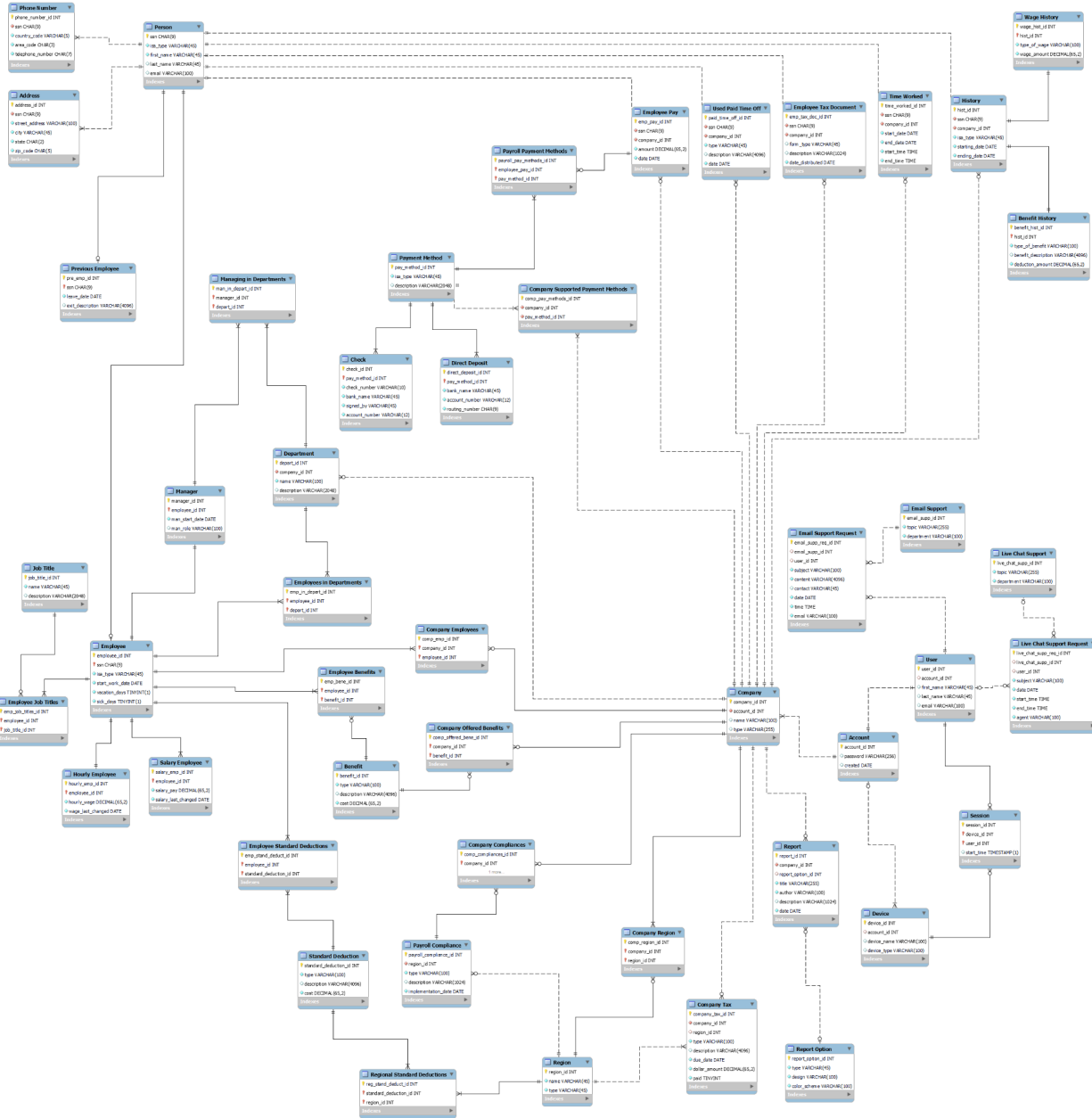


Table	FK	ON DELETE	ON UPDATE	COMMENT
Device	account_id	SET NULL	CASCADE	If an account is deleted, then it will also be disassociated from the device.
User	account_id	SET NULL	CASCADE	If an account is deleted, it will also be disassociated from the user.
Session	user_id	CASCADE	CASCADE	If the user goes away, then the session will close.
Session	device_id	CASCADE	CASCADE	If the device is separated, then the session will be deleted.
Company	account_id	CASCADE	CASCADE	If the account is deleted, then all information tied to the account will also be deleted, including the companies pertaining to it.
Company Supported Payment Methods	company_id	CASCADE	CASCADE	If the company is deleted, then it's supported payment options should also be deleted as well.
Company Supported Payment Methods	pay_method_id	CASCADE	CASCADE	If the pay method is removed from the system, then the company can't support it anymore.
Employee	ssn	CASCADE	CASCADE	If the person is deleted from the system, so will their employee information.
Company Employees	company_id	CASCADE	CASCADE	If the company is deleted, then the employees association with the company will also disappear.
Company Employees	employee_id	CASCADE	CASCADE	If an employee is deleted, then it's association with the company will also go away.
Company Offered Benefits	company_id	CASCADE	CASCADE	If the company is deleted, then so do their offered benefits.
Company Offered Benefits	benefit_id	CASCADE	CASCADE	If a benefit is deleted from the system, it can't be offered anymore.
Company Region	company_id	CASCADE	CASCADE	If a company is deleted, then it's association with the region goes away.

Company Region	region_id	CASCADE	CASCADE	If a region goes away, then so will a company's association with it.
Payroll Compliance	region_id	CASCADE	CASCADE	If a region goes away, then so do it's required compliances.
Company Compliances	company_id	CASCADE	CASCADE	If a company is removed, then the compliances it needs to follow goes away.
Company Compliances	payroll_compliance_id	CASCADE	CASCADE	If the payroll compliances go away, then so should its association with companies.
Employee Job Titles	employee_id	CASCADE	CASCADE	If the employee is removed, then so with their job title be removed.
Employee Job Titles	job_title_id	CASCADE	CASCADE	If a job title is removed from the system, then employees can't have them.
Employee Benefits	employee_id	CASCADE	CASCADE	If an employee is removed, then so are their associated benefits.
Employee Benefits	benefit_id	CASCADE	CASCADE	If a benefit is removed from the system, then employees can't have them,
Employee Standard Deductions	employee_id	CASCADE	CASCADE	If an employee is removed, then so are their standard deductions.
Employee Standard Deductions	standard_deduction_id	CASCADE	CASCADE	If a standard deduction is removed, then the employees no longer get them.
Previous Employee	ssn	NO ACTION	CASCADE	If a previous employee is removed, they should remain as a person.
Manager	employee_id	CASCADE	CASCADE	If an employee is removed, and they are also manager, they will also be removed as manager.
Department	company_id	CASCADE	CASCADE	If a company is deleted, then so will it's associated departments.
Managing in Departments	manager_id	CASCADE	CASCADE	If a manager is removed, then so will their association to the department.

Managing in Departments	depart_id	CASCADE	CASCADE	If a department is removed, then so will their association with its managers.
Employees in Departments	employee_id	CASCADE	CASCADE	If an employee is removed, so will their association with their department.
Employees in Departments	depart_id	CASCADE	CASCADE	If a department is closed, then so will their association with the employees be closed.
Address	ssn	CASCADE	CASCADE	If a person is removed from the system, then their address shall also be removed.
Phone Number	ssn	CASCADE	CASCADE	If a person is removed from the system, then so shall their phone number be removed.
Regional Standard Deductions	standard_deduction_id	CASCADE	CASCADE	If a standard deduction is removed, then it no longer has an association with the region.
Regional Standard Deductions	region_id	CASCADE	CASCADE	If a region is removed, then so will its associated standard deductions.
Time Worked	ssn	CASCADE	CASCADE	If a person is removed, then so are the records of the time they have worked.
Time Worked	company_id	CASCADE	CASCADE	If a company is removed, then so are the records of the time that was worked there.
Hourly Employee	employee_id	CASCADE	CASCADE	If an employee is removed, then so is the corresponding hourly employee.
Salary Employee	employee_id	CASCADE	CASCADE	If an employee is removed, then so is the corresponding salary employee.
Employee Pay	ssn	NO ACTION	CASCADE	If a person is removed from the system, the employee pay record should remain for the company's sake.
Employee Pay	company_id	CASCADE	CASCADE	If a company is deleted, then it's records of employee payments should also be deleted.

Payroll Payment Methods	employee_pay_id	CASCADE	CASCADE	If the employee pay record is removed, then its payment method used should also go away.
Payroll Payment Methods	pay_methods_id	CASCADE	CASCADE	If the pay method is removed from the system, then it's association with the employees pay will also go away.
Check	pay_method_id	CASCADE	CASCADE	If a pay method is removed, then so shall the check associated with it also be removed.
Direct Deposit	pay_method_id	CASCADE	CASCADE	If a pay method is removed, then so shall the direct deposit associated with it also be removed.
History	ssn	NO ACTION	CASCADE	If a person is removed, their history with the company should remain while the company exists.
History	company_id	CASCADE	CASCADE	If a company is deleted, then all its history will also be deleted.
Wage Hlstory	hist_id	CASCADE	CASCADE	If a history is deleted, then so will the wage history also delete.
Benefit History	hist_id	CASCADE	CASCADE	If a history is deleted, then so will the benefit history be deleted.
Used Paid Time Off	ssn	NO ACTION	CASCADE	If a person is deleted, then the used paid time off should remain for the company's sake, also leaving the ssn for records.
Used Paid Time Off	company_id	CASCADE	CASCADE	If a company is deleted, then so shall the records of people's used paid time off.
Company Tax	company_id	CASCADE	CASCADE	If a company is deleted, then so shall all the company tax records be deleted.
Company Tax	region_id	SET NULL	CASCADE	If a region is removed, the company tax records should still remain.
Employee Tax Document	ssn	NO ACTION	CASCADE	If a person is deleted, their tax documentation shall remain with the company.

Employee Tax Document	company_id	CASCADE	CASCADE	If a company is deleted, then so will all their employee tax documents be deleted.
Email Support Request	email_supp_id	SET NULL	CASCADE	If the email support type is removed, the request will still remain in the system. Set null, since the old id will have no value.
Email Support Request	user_id	SET NULL	CASCADE	If the user is removed, the request will still remain for the records. Set null, since the old id will have no value.
Live Chat Support Request	live_chat_supp_id	SET NULL	CASCADE	If a live chat support type is removed the request should remain for records. Set null, since the old id will have no value.
Live Chat Support Request	user_id	SET NULL	CASCADE	If the user is removed, the request should still remain for records. Set null, since the old id will have no value.
Report	company_id	CASCADE	CASCADE	If a company is deleted, so shall their related records be deleted.
Report	report_option_id	SET NULL	CASCADE	If a report option is removed, the report shall still remain for the company's sake. Set null, since the old id will have no value.

XI: Testing Table/EER

Number	Entity	SQLQuery	Pass/ Fail	Error Description	Possible Solution
1	Account	Delete	Pass	None	None
1	Account	Update	Pass	None	None
2	Device	Delete	Pass	None	None
2	Device	Update	Pass	None	None
3	User	Delete	Pass	None	None
3	User	Update	Pass	None	None
4	Session	Delete	Pass	None	None
4	Session	Update	Pass	None	None
5	Company	Delete	Pass	None	None
5	Company	Update	Pass	None	None
6	Payment Method	Delete	Pass	None	None
6	Payment Method	Update	Pass	None	None
7	Company Supported Payment Methods	Delete	Pass	None	None
7	Company Supported Payment Methods	Update	Pass	None	None
8	Person	Delete	Fail	Cannot delete or update a parent row: a foreign key constraint fails	History FK that is tied to this is set to NO ACTION, needs to be set to CASCADE on delete so the history will also be able to be deleted.
8	Person	Update	Pass	None	None
9	Employee	Delete	Fail	Unknown column 'start_work_day' in 'where clause'	Fix naming in test to start_work_date

9	Employee	Update	Pass	None	None
10	Company Employees	Delete	Pass	None	None
10	Company Employees	Update	Pass	None	None
11	Benefit	Delete	Pass	None	None
11	Benefit	Update	Pass	None	None
12	Company Offered Benefits	Delete	Pass	None	None
12	Company Offered Benefits	Update	Pass	None	None
13	Region	Delete	Pass	None	None
13	Region	Update	Pass	None	None
14	Company Region	Delete	Pass	None	None
14	Company Region	Update	Pass	None	None
15	Payroll Compliance	Delete	Pass	None	None
15	Payroll Compliance	Update	Pass	None	None
16	Company Compliances	Delete	Pass	None	None
16	Company Compliances	Update	Fail	Cannot add or update a child row: a foreign key constraint fails	Tried to update a column that was removed from a previous deletion, either insert it back, or delete something else.
17	Job Title	Delete	Pass	None	None
17	Job Title	Update	Pass	None	None
18	Employee Job Titles	Delete	Pass	None	None
18	Employee Job Titles	Update	Pass	None	None

19	Employee Benefits	Delete	Pass	None	None
19	Employee Benefits	Update	Pass	None	None
20	Standard Deduction	Delete	Pass	None	None
20	Standard Deduction	Update	Pass	None	None
21	Employee Standard Deductions	Delete	Pass	None	None
21	Employee Standard Deductions	Update	Pass	None	None
22	Previous Employee	Delete	Pass	None	None
22	Previous Employee	Update	Pass	None	None
23	Manager	Delete	Pass	None	None
23	Manager	Update	Pass	None	None
24	Department	Delete	Pass	None	None
24	Department	Update	Pass	None	None
25	Managing in Departments	Delete	Pass	None	None
25	Managing in Departments	Update	Pass	None	None
26	Employees in Departments	Delete	Pass	None	None
26	Employees in Departments	Update	Fail	Unknown column 'employee_id' in 'field list'	Misspelled employee_id in test, need to fix spelling.
27	Address	Delete	Pass	None	None
27	Address	Update	Pass	None	None
28	Phone Number	Delete	Pass	None	None

28	Phone Number	Update	Pass	None	None
29	Regional Standard Deductions	Delete	Pass	None	None
29	Regional Standard Deductions	Update	Pass	None	None
30	Time Worked	Delete	Pass	None	None
30	Time Worked	Update	Pass	None	None
31	Hourly Employee	Delete	Pass	None	None
31	Hourly Employee	Update	Pass	None	None
32	Salary Employee	Delete	Pass	None	None
32	Salary Employee	Update	Pass	None	None
33	Employee Pay	Delete	Pass	None	None
33	Employee Pay	Update	Pass	None	None
34	Payroll Payment Methods	Delete	Pass	None	None
34	Payroll Payment Methods	Update	Pass	None	None
35	Check	Delete	Pass	None	None
35	Check	Update	Pass	None	None
36	Direct Deposit	Delete	Pass	None	None
36	Direct Deposit	Update	Pass	None	None
37	History	Delete	Pass	None	None
37	History	Update	Pass	None	None

38	Wage History	Delete	Pass	None	None
38	Wage History	Update	Pass	None	None
39	Benefit History	Delete	Pass	None	None
39	Benefit History	Update	Pass	None	None
40	Used Paid Time Off	Delete	Pass	None	None
40	Used Paid Time Off	Update	Pass	None	None
41	Company Tax	Delete	Pass	None	None
41	Company Tax	Update	Pass	None	None
42	Employee Tax Document	Delete	Pass	None	None
42	Employee Tax Document	Update	Pass	None	None
43	Email Support	Delete	Pass	None	None
43	Email Support	Update	Pass	None	None
44	Email Support Request	Delete	Pass	None	None
44	Email Support Request	Update	Pass	None	None
45	Live Chat Support	Delete	Pass	None	None
45	Live Chat Support	Update	Pass	None	None
46	Live Chat Support Request	Delete	Pass	None	None

46	Live Chat Support Request	Update	Pass	None	None
47	Report Option	Delete	Pass	None	None
47	Report Option	Update	Pass	None	None
48	Report	Delete	Pass	None	None
48	Report	Update	Pass	None	None