Research Lab

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Background

- A research lab in downtown, part of Toronto Western General Hospital
- Current research molecular mechanisms of the spondyloarthropathies (a family of arthritic disease)
- Organization members:
  - Principal Investigator (Dr. Inman)
  - 2 researchers (graduate students)
  - Lab manager
  - Technician

Problem

- Lack of a system which controls and manipulates data processing
- Require a collective database to store and sort all research reports, equipment and chemicals
  - Data is stored separately, no interaction between researcher
  - Data store in paper, needs to redo experiment if data is lost.
  - Chemical and equipment are ordered separately

Functional Requirements

- Researcher
  - Research
    - The main function of a researcher
    - Methods includes
      - Create_project(proposal)
      - Check_project (project)
      - Outsource(project, outsourceCompany)
      - Set_project_status(status, project)
      - Save_experiment_result(result, project)
      - Submit_report(report, project)
      - Generate_report(project, format)
      - Generate_experiment_result(project, format)
      - Generate_project_review(project)

Functional Requirements(Cont'd)

- Maintain Inventory
  - Check the inventory by reading a barcode, order material(If necessary)
  - Methods includes
    - Print_barcode()
    - Read_barcode()
    - Check_inventory(resource)
    - Instock(resource)
    - Outstock(resource)
    - Create_purchase_order(order)
    - Check_order_status(order)
    - Generate_inventory_report()

Functional Requirements(Cont'd)

- Request Technician
  - Call technician for help
  - Methods include
    - Create_tech_request(request)
    - Check_request(request)

Functional Requirements(Cont'd)

- Principal Investigator
  - Financial Function
    - Manage fund of the lab
    - Methods include
      - Create_fund_request(request)
      - Request_fund(request, customer)
      - Review_funding()
      - Generate_fiscal_report()
  - Checking inventory
    - Check the inventory
    - Methods include
      - Check_inventory(resource)
      - Generate_inventory_report()
  - Request technician
    - Call technician for help
    - Methods include
      - Create_tech_request(request)
      - Check_request(request)

Functional Requirements(Cont'd)

- Human Resource Activities
  - Hiring, firing, evaluating employee
  - Methods include
    - Create_candidate(candidate)
    - Review(candidate)
    - Interview(candidate)
    - View_History(candidate)
    - Evaluate(candidate)
    - Give_raise(employee, amount)
    - Hire(employee)
    - Fire(employee)
    - Generate_candidate_report()
- Communication Activities
  - Call up for meeting, email etc
  - Methods include
    - Send(Document, receiver)
    - Receive_message()
    - Review_message_record()
    - Generate_message_log()

Functional Requirements(Cont'd)

- Technician
  - Manage request
    - Deal with technical requests from other members
    - Methods include
      - Check_request(request)
      - Finish_request(request)
      - Feedback(user)
  - Maintain system
    - Keep the system up-to-date, free-from malicious attack
    - Methods include
      - Back_up()
      - Update()
      - Repair()
      - purchase_request(resource)
      - Troubleshooting()

Non-functional Requirements

- Interface requirements
  - Easy to be understood
  - Easy to be implemented

Non-functional Requirements

- Operating requirements
  - Researcher
    - Generate report
      - Able to create new report folder to store and organize their experiments result
  - Principal Investigator
    - Generate form
      - Able to choose different template to view any report(e.g. experiment report, monthly lab inventory report)
  - Technician
    - Train
      - Training other member and new member on how to use the new system

Non-functional Requirements

- Performance requirements
  - Time/space bounds
    - Provides reasonable response rate
    - Takes up small space in the lab
  - Reliability
    - Probability of failure
    - Mean time between failure: 1 hour per month for updating and backup

Non-functional Requirements

- Survivability
  - Reports are saved in both soft and hard copy, in different area
  - Lab inventory is only saved in the database
- Security
  - Different user groups are given different accessibility to the system.
  - Principal Investigator:full access to everything
  - Researcher: full access to both his report and lab's inventory database
  - Technician: full access only to the database
  - Client: Only view access to the report they are sponsoring

Alternative

- Software
  - Linux
  - Crystal Report
  - Eclipse
  - MySQL
- Hardware:
  - Server
  - Barcode scanner
  - Printer
  - Desktops
  - Barcode label printer
  - Laser printer

Alternative

- Pros
  - Cheaper implementation
  - High system stability
  - High performance
  - High security
- Cons
  - Low user friendliness
  - Long training time

Optimal Solution

- Software
  - Windows OS
  - Crystal Report
  - Windows Server 2008
  - MySQL
- Hardware:
  - Server
  - Barcode scanner
  - Printer
  - Desktops
  - Barcode label printer
  - Laser printer

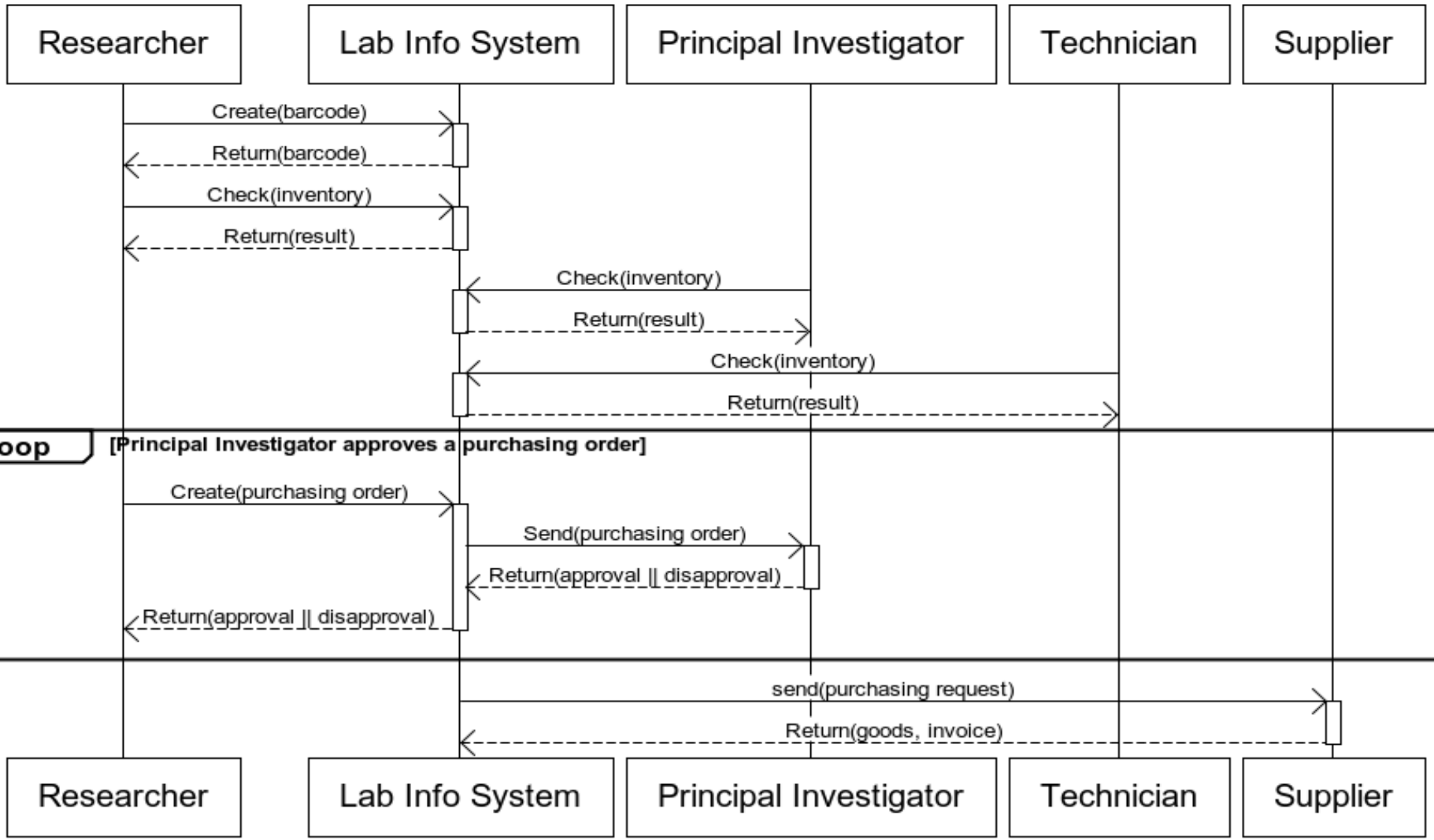
Optimal Solution

- Pros:
  - Quick learning curve for lab members
  - Quick and Easy implementation
  - High performance
  - High security
- Cons:
  - Expensive – but better productivity
  - Medium system stability

Hardware

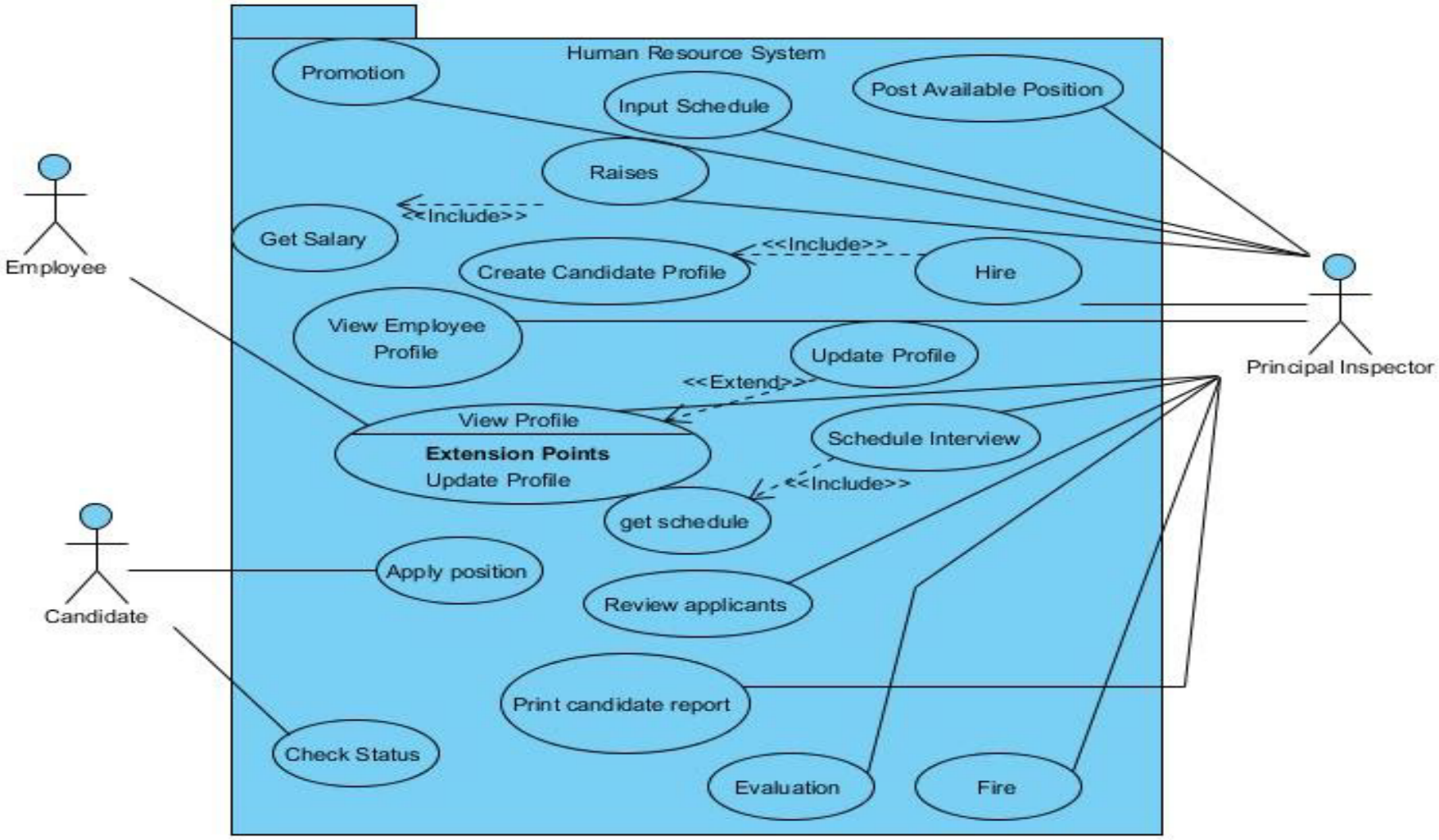
- Basic hardware components:
  - (1) Server
  - (3) Computers
  - (1) Barcode Label Printer
  - (1) Barcode Scanner
  - (1) Laser Printer
  - (1) Router

UML Diagrams: Report's Sequence Diagram

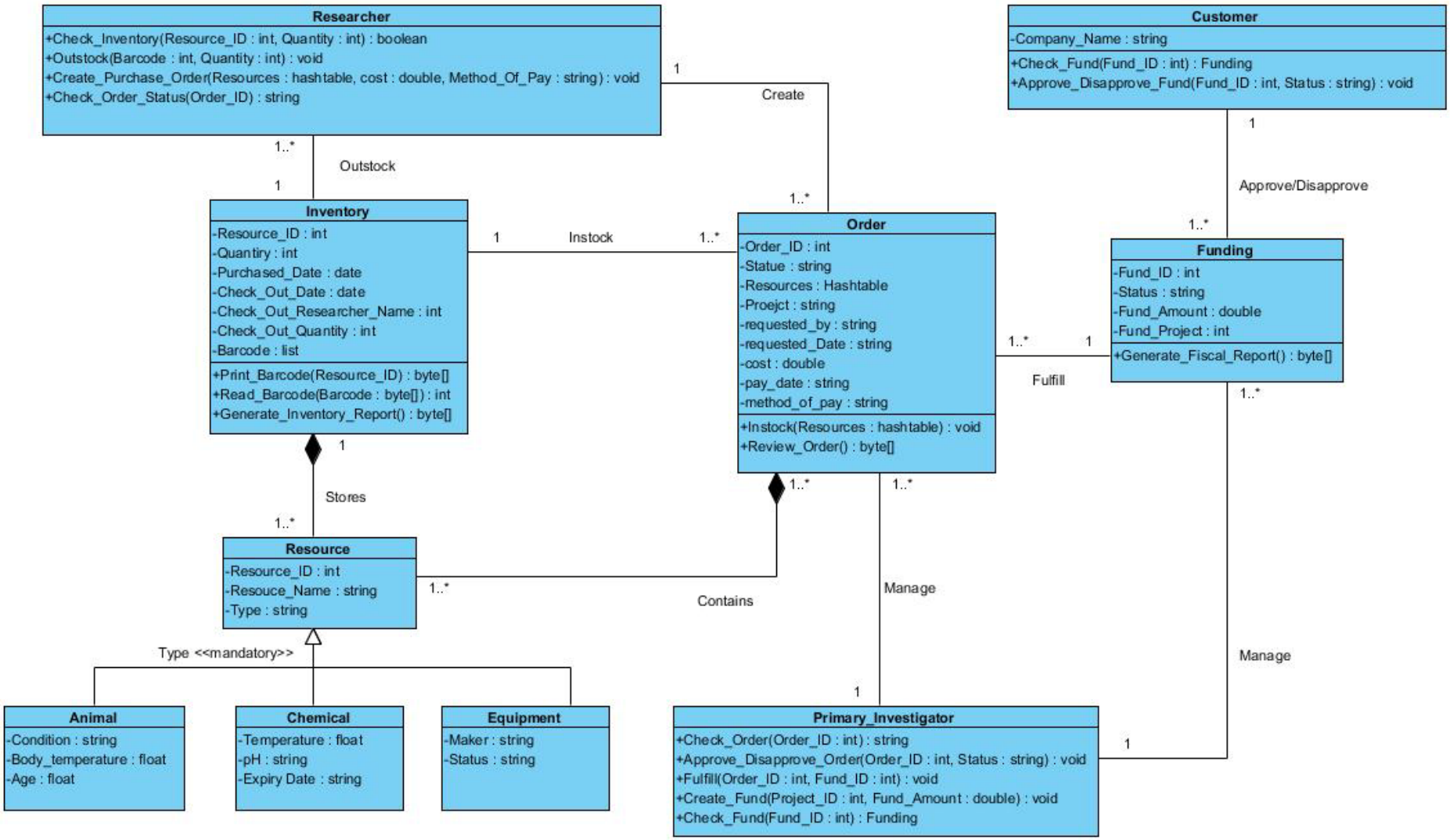


www.websequencediagrams.com

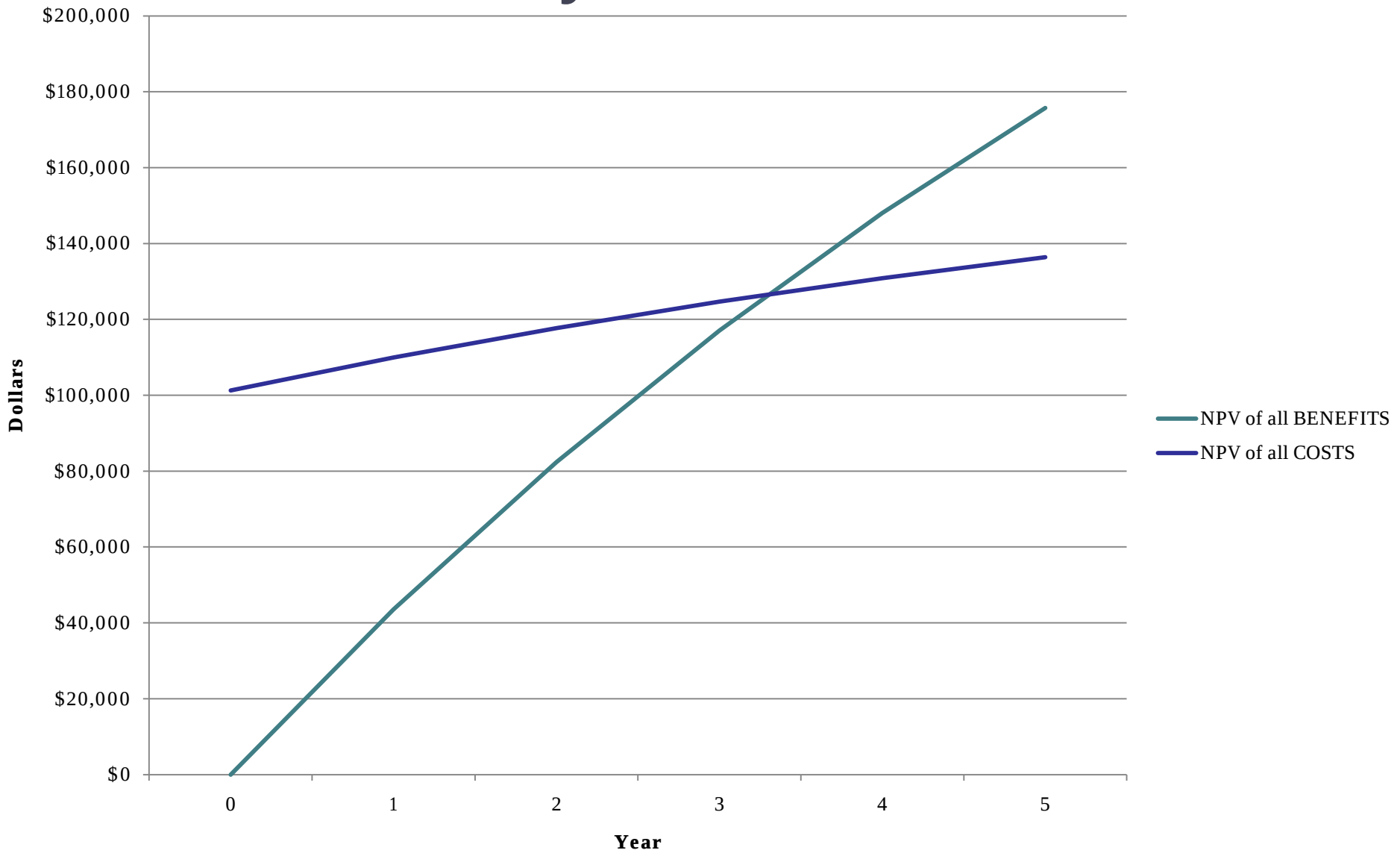
UML Diagrams: Human Resource Use Case



UML Diagrams: Inventory Class diagram



Break-even analysis



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