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CS200 - Group 11 “Java Bosses”

Kitting Cell Design Document

//

Delete this before submitting

Notes (add notes, questions, and suggestions here):

/**Anthony***/
-added a Camera class in the helper class area, which i think should belong on the server because multiple clients need to take pictures.
---- Anthony
/***/

/**Cullon**/
Here’s my number if you have any questions or complaints for me: 308-529-2840. I will be finishing my gantry this afternoon.

From Cullon:
Justin has done a great job of getting us started, guys. Something we should try to follow is consistent naming conventions so that we are all on the same page when things start getting serious and confusing. It really *does* help and doesn’t require any extra work. So, I recommend the following:

JLabels are prefixed with lbl_____ (the blank is where your variable name will go)
JTextFields are prefixed with txt_____
JButtons are prefixed with btn_____
Sockets shall be named sock[clientName] (e.g. the gantry socket will be named sockGantry)

(add more as they come to mind)
/***/

/**Joseph**/
From Joseph:

JComboBoxes are prefixed with jcb___
Panels are prefixed with pnl_____
/**/

/**Andrew***/
I am using camelCase (first character lowercase) for variables and CamelCase (first character uppercase) for constants (a.k.a. final variables). Is that what the rest of you do?

The helper classes I made are NetComm, ConnectPanel, and Movement, and you can view the code for them at https://github.com/usc-csci200-fall2012/team11. See my email for where and how to use them.

Justin reminds me to add comments if anyone needs to move more classes to data classes section

remember to note who did what in design doc
/**/
//

Purpose/Overview:

This program is designed to provide GUI support to a kitting cell that assembles kits full of parts for use by other assembly cells. There will be one server application to interact with the back end of the kitting cell and track the state of each of the cell's devices. There will be several client applications that will serve as a GUI for various humans needing to interact with the kitting cell. These client applications will communicate with the server application to display the state of various cell devices to their respective user. They will also take input to send configuration information to the cell. Figure 1 below shows what the factory production manager's monitoring screen will look like.

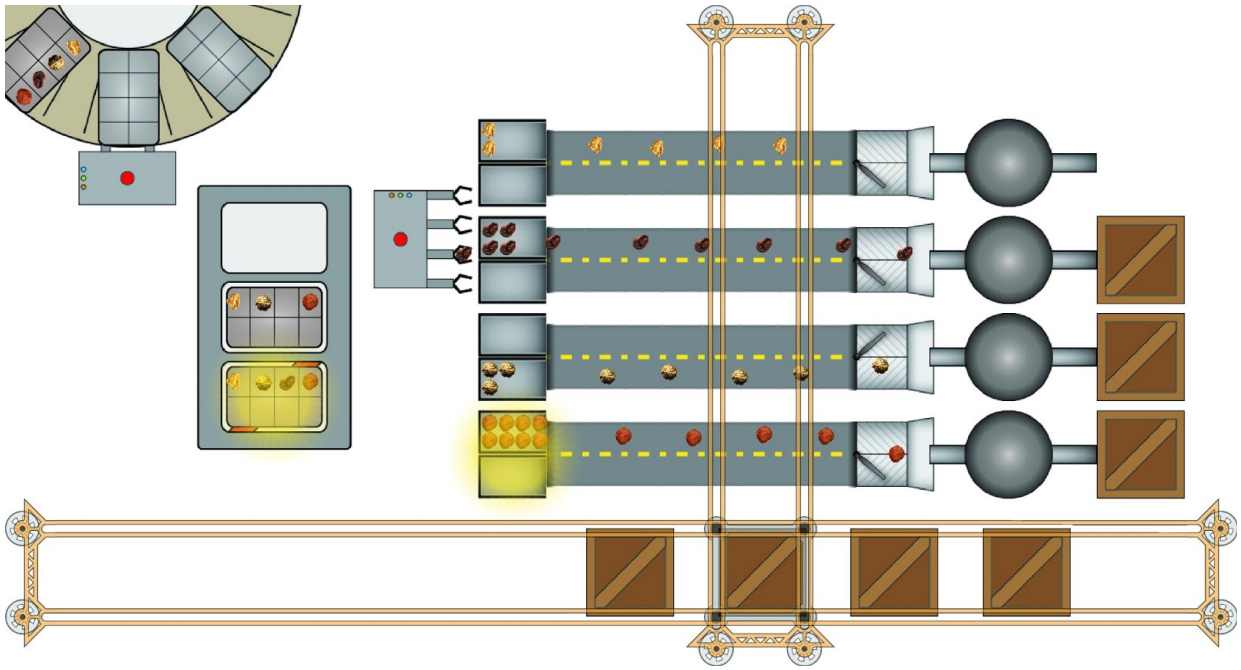


Figure 1: Concept art of the factory manager's view of the kitting cell.

Requirements:

This piece of software will have one server application which will send and receive information to and from the back end of the kitting cell and will communicate similarly with several GUI clients. The server will hold the "state" information about each device within the cell. This information may be updated by the front or back end. Each of the client application GUIs will allow a kitting cell employee to view the state of the device(s) for which they are responsible. Some GUIs will also allow the user to set configuration information or simulate non-normative scenarios within the factory. The GUI clients consist of:

- Parts Manager
    - Set available parts (create, edit, delete)
    - Parts will have the following attributes (number, name, description, image)
    - This panel will not have any graphics
    - Parts will be serializable
- Kit Manager
    - Set available kits (create, edit, delete)
    - Kits will have the following attributes (number, name, description, static image)
    - Assigns location of a part in the kit
    - This panel will not have graphics
    - Kits will be serializable
- Factory Production Manager
    - Specific the kit making queue for the factory from available kits list
        - Which kit
        - How many of each
    - View current production schedule
    - Graphical view of entire factory

- Lane Manager
    - Graphics for:
        - Feeders
        - Lanes
        - Nests
        - Diverters
        - Nest cameras
    - Panel for non-normative operation
        - Break/fix devices within lane manager's purview
- Kit Assembly Manager
    - Graphics for:
        - Part robot
        - Kit robot
        - Kitting stand
        - Kit delivery station
    - Panel for non-normative operation
        - Break/fix devices within kit manager's purview
- Gantry Robot Manager
    - Graphics for:
        - Gantry robot
        - Parts bins
        - Purge station
    - Panel for non-normative operation
        - Break/fix devices within gantry robot manager's purview

Data Classes (these all implement Serializable):

- Movement
    - represents the movement of an object that starts at a specified position and rotation, moves at constant velocity to a specified end position and rotation, then stops
    - Member Data (all private):
        - startPos - position at beginning of this move
        - startRot - counterclockwise rotation in radians at beginning of this move
        - startTime - time that this move starts, in milliseconds after the simulation started
        - endPos - position at end of this move
        - endRot - counterclockwise rotation in radians at end of this move
        - endTime - time that this move ends, in milliseconds after the simulation started
    - Methods:
        - Movement - constructor that sets all instance variables to specified values
        - getPosWhen - returns position at specified time
        - getRotWhen - returns rotation at specified time

- GUIData
    - Contstructor(double x, double y)
    - Contstructor(double x, double y, double rotation)
    - Member data:
        - x_current - current x location (double)
        - y_current - current y location (double)
        - x_desired - desired x location (double)
        - y_desired - desired y location (double)
        - rotation_current - current rotation (double)
        - rotation_desired - desired rotation (double)
    - Methods:
        - void setCurrentX(double x)
        - void setCurrentY(double y)
        - void setCurrentRotation(double angle)
        - void setCurrentLocation(Point2D.Double location)
        - void setDesiredX(double x)
        - void setDesiredY(double y)
        - void setDesiredRotation(double angle)
        - void setDesiredLocation(Point2D.Double location)

- Part-- implements serializable
    - This class defines a parts and its attributes.
    - Member Data:
        - image– ImageIcon to represent the image of the part.
        - imagepath - the address of the image
        - number – int part number
        - name – string part name
        - description – string part description
        - GUIPart guiPart -- used to easily link to the GUI equivalent
    - Methods:
        - setPartImage(ImageIcon image) – to set the image to the given part.
        - setPartName() – set the name of the part
        - setPartDescription() – return the description of the part
        - setPartNumber() – set the number of the part(it has to be a specific one)
        - getPartsName() – return the name of the part
        - getPartsNumber() – return the number of the part
        - getPartsDescription() – return the description of the part
        - deletePart() – delete this kind of part and delete this kind part from the arrayList
        - tick(long elapsedMillis) - calls guiPart's draw method

- GUIPart -- extends GUIData

    - Contains data and methods for drawing and animating a part
    - Constructor: GUIPart(Part part, double x, double y)
    - Member data:
        - Part part - used to access part data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- Kit --implements serializable
    - This class defines a kit and its attributes, use gridLayout to define the part location.
    - Member Data:
        - number – int kit number.
        - name – string kit name
        - description – string kit description
        - kitImage - static image of a kit
        - PartsInKit - list of what parts does this kit need
        - kitStatus - is it being produced or in queue
        - GUIKit guiKit - used to easily link to the GUI equivalent
    - Methods:
        - setKitName() – set the name of the kit
        - getKitStatus() - return the kit status
        - setKitStatus() - set the kit status
        - setKitDescription() – return the description of the kit
        - setKitNumber() – set the number of the kit (it has to be a specific one)
        - setPartLocation(Part p1,integer I1) - Assigns location of a part in the kit
        - setPartsInKit(ArrayList<Kit> kits) - set the parts in a kit
        - getPartsInKit() - get the parts in a kit
        - deleteKit() – delete this kind of kit and delete the kits from the arrayList
        - tick(long elapsedMillis) - calls the guiKit's draw method

- GUIKit -- extends GUIData
    - Contains data and methods for drawing and animating a kit
    - Constructor: GUIKit(Kit kit, double x, double y)
    - Member data:
        - Kit kit - used to access kit data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- PartRobot
    - This class defines and controls a part robot.
    - Member Data:
        - xPos - int x-coordinate of position
        - yPos - int y-coordinate of position

        - partsInGripper - ArrayList of Part type of what is in the grippers
        - isBroken - boolean variable if robot is broken
        - GUIPartRobot guiPartRobot - used to easily link to the GUI equivalent
    - Methods:
        - sendPos - returns the position of the part robot
        - getTask - gets a task to perform
        - setBroken - sets isBroken
        - getBroken - returns isBroken value
        - tick(long elapsedMillis) - calls the guiPartRobot's draw method

- GUIPartRobot -- extends GUIData
    - Contains data and methods for drawing and animating a part robot
    - Constructor: GUIPartRobot(PartRobot partRobot, double x, double y)
    - Member data:
        - PartRobot partRobot - used to access part robot data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- KitRobot
    - This class defines and controls a part robot.
    - Member Data:
        - xPos - int x-coordinate of position
        - yPos - int y-coordinate of position
        - kitInHand - a Kit variable of the kit in its hands/grippers
        - isBroken - boolean variable if robot is broken
        - GUIKitRobot guiKitRobot - used to easily link to the GUI equivalent
    - Methods:
        - sendPos - returns the position of the kit robot
        - getTask - gets a task to perform
        - setBroken - sets isBroken
        - getBroken - returns isBroken value
        - tick(long elapsedMillis) - calls the guiKitRobot's draw method

- GUIKitRobot -- extends GUIData
    - Contains data and methods for drawing and animating a kit robot
    - Constructor: GUIKitRobot(KitRobot kitRobot, double x, double y)
    - Member data:
        - KitRobot kitRobot - used to access kit robot data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- KitDeliveryStation
    - This class contains all the information about the state of the kit delivery station.
    - Member data:

        - isBroken - boolean variable if conveyor is broken
        - pallets - ArrayList of pallets that are currently visible
        - GUIKitDeliveryStation guiKitDeliveryStation - used to easily link to the GUI equivalent
    - Methods:
        - setBroken - sets isBroken
        - getBroken - returns isBroken value
        - tick(long elapsedMillis) - calls the guiKitDeliveryStation's draw method

- GUIKitDeliveryStation -- extends GUIData
    - Contains data and methods for drawing and animating the kit delivery station
    - Constructor: GUIKitDeliveryStation (KitDeliveryStation kitDeliveryStation, double x, double y)
    - Member data:
        - KitDeliveryStation kitDeliveryStation - used to access delivery station data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- Pallet
    - This class contains all the information about a pallet.
    - Member data:
        - hasKit - boolean variable if the pallet has a kit.
        - kitFull - boolean variable to display generic full/empty kit.
        - xPos - int x-coordinate of position
        - yPos - int y-coordinate of position
        - GUIPallet guiPallet - used to easily link to the GUI equivalent
    - Methods:
        - tick(long elapsedMillis) - calls the GUI draw method

- GUIPallet -- extends GUIData
    - Contains data and methods for drawing and animating the pallet
    - Constructor: GUIPallet (Pallet pallet, double x, double y)
    - Member data:
        - KitDeliveryStation kitDeliveryStation - used to access pallet data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- Gantry
    - This class defines and controls a gantry robot.
    - Member Data:
        - xPos - int x-coordinate of position
        - yPos - int y-coordinate of position
        - SERVER SIDE//////////holdingObject - boolean variable that detects if the
            - gantry is currently holding an object

        - broken- boolean variable recording the state of this client
        - availableLocations - arraylist of open places to place a bin
        - destinationCoordinateX - x-coordinate of destination location
        - destinationCoordinateY - y-coordinate of destination location
        - GUIGantry guiGantry - used to easily link to the GUI equivalent
    - Methods:
        - SERVER SIDE///////isHoldingObject - returns value of holdingItem
        - SERVER SIDE///////retrieveFullBin(bin, feeder) - acts according to which
            - feeder requests which bin (this method will utilize the helper
            - methods moveTo(), pickUp(), dump(), and drop())
        - SERVER SIDE///////placeInPurgeStation(feeder) - acts according to which
            - feeder was just fed (this method will utilize the helper methods
            - moveTo(), pickUp(), dump(), and drop())
        - SERVER SIDE///////placeInTempLoc - acts according to
            - availableLocations (thismethod will utilize the helper methods
            - moveTo(), pickUp(), dump(),and drop())
        - isBroken - returns value of broken; affects the physical look of the gantry
            - robot depending on broken state
        - moveTo - either move to the new bin's location, move to the feeder with the new bin, move empty bin to purge station, or move purged bin to temporary location depending
        - pickUp - commands gantry to pick up the bin at its current array index (in availableLocations arraylist)
        - dump - feed contents of bin into feeder
        - drop - place bin at gantry's current array index (in availableLocation arraylist)
        - tick(long elapsedMillis) - calls the GUI draw method

- GUIGantry -- extends GUIData
    - Contains data and methods for drawing and animating the gantry
    - Constructor: GUIGantry(Pallet pallet, double x, double y)
    - Member data:
        - Gantry gantry - used to access gantry data
    - Methods:
        - void draw(Graphics g, long elapsedMillis)

- Bin(Part part)
    - This class contains all the information about bins. The bins will be responsible for
        - a single type of part, which will be passed into its constructor upon
        - instantiation
    - Member Data:
        - partName- name of part represented by type String

        - partImage - image of part used to identify bin
        - xPos - position of x-coordinate
        - yPos - position of y-coordinate
        - GUIBin guiBin - used to easily link to the GUI equivalent
    - Methods:
        - getPartType- returns part type held by bin
        - tick(long elapsedMillis) - calls the GUI draw method

- GUIBin -- extends GUIData
    - Contains data and methods for drawing and animating a bin
    - Constructor: GUIBin (Bin bin, double x, double y)
    - Member data:
        - Bin bin - used to access bin data
    - Methods:
      void draw(Graphics g, long elapsedMillis)

Camera:

Camera that takes pictures

Member data:

myImage - image that is saved after taking a picture

flashLocation - location of where the camera will take its picture

(Ignore “cameraInUse” if agents take care of camera timing)

cameraInUse - boolean variable for when camera is in use

Method:

isCameraInUse() - checks if camera is in use

setLocation() - sets flashLocation to where a picture will be taken

takePicture() - the camera will flash, take a picture, and store it in myImage

getImage() - returns the image

(Ignore following methods if agents take care of camera timing)

usingCamera() - sets cameraInUse to true

doneUsingCamera() - sets cameraInUse to false

todo: define GUICamera

Networking Message Classes (these all implement Serializable):

CloseConnectionMsg

networking message indicating to close connection

class is empty (no member data or methods) because the requested command is self-evident from the data type

StringMsg

networking message containing a string
Member Data (all public):
type - instance of an enum indicating the type of message (NewPart, ChangePart, DeletePart, NewKit, ChangeKit, DeleteKit, ProduceKits, NonNormative)
message - content of string message (generally empty strings indicate success and non-empty strings are an error description)
Methods:
StringMsg - constructor to set up StringMsg with specified type and message

NewPartMsg
networking message indicating to add a new part
(is a separate class even though it only contains 1 instance variable because it specifies that the command is to add a new part)
Member Data (all public):
part - Part instance to add

ChangePartMsg
networking message indicating to change a part
Member Data (all public):
oldName - old name of part to change
part - replacement Part

DeletePartMsg
networking message indicating to delete a part
Member Data (all public):
name - name of part to delete

PartListMsg
networking message listing all available parts
Member Data (all public):
parts - ArrayList of available parts

NewKitMsg
networking message indicating to add a new kit
(is a separate class even though it only contains 1 instance variable because it specifies that the command is to add a new kit)
Member Data (all public):
kit - Kit instance to add

ChangeKitMsg
networking message indicating to change a kit
Member Data (all public):
oldName - old name of kit to change

kit - replacement Kit

DeleteKitMsg
networking message indicating to delete a Kit
Member Data (all public):
name - name of kit to delete

KitListMsg
networking message listing all available kits
Member Data (all public):
kits - ArrayList of available kits

ProduceKitsMsg
networking message specifying kits to produce in factory
Member Data (all public):
name - name of kit to produce
howMany - how many new kits to produce

ProduceStatusMsg
networking message listing status of all kits in production
Member Data (all public):
kitCmds - ArrayList of ProduceKitsMsg's that have been sent to server
kitStatus - ArrayList of instances of an enum indicating whether each kit command is queued, in production, or completed

FactoryStateMsg

NonNormativeItemMsg
networking message indicating to break or fix an item
Member Data (all public):
fix - true if should fix item, false if should break item
type - instance of an enum indicating the type of item to break or fix (todo: list types)
id - integer ID of item to break or fix

Manager Classes:
Server:
Server
class implementing a non-GUI server application to coordinate factory clients over a network
Member Constants (all public and static):
Port - networking port that server listens on
SettingsPath - path of file where factory state is saved
Member Data (all private):

serverSocket - server socket used to set up connections with clients
netComms - ArrayList of client connections
partTypes - ArrayList of Parts that are available to produce
kitTypes - ArrayList of Kits that are available to produce
produceStatus - ProduceStatusMsg storing current kit production status
todo: store factory state (also need a way to know which clients to send updated factory state to)

Methods:

Server - constructor for server class
main - instantiates a new Server
actionPerformed - called during timer tick; updates simulation and broadcasts updated factory state to clients
msgReceived - handle message received from clients (takes message and NetComm that received the message); generally calls another method to handle the specific message
addPart - takes an AddPartMsg and client index, adds part to partTypes (if valid), sends StringMsg to client indicating success or failure
changePart - takes a ChangePartMsg and client index, changes specified part (if valid and not in production), sends StringMsg to client indicating success or failure
deletePart - takes a DeletePartMsg and client index, deletes part with specified name (if exists), sends StringMsg to client indicating success or failure
listParts - takes client index and sends partTypes to client in a PartListMsg (called when server receives a PartListMsg, but received message is not a parameter because it doesn't influence behavior of the method)
addKit - takes an AddKitMsg and client index, adds kit to kitTypes (if valid), sends StringMsg to client indicating success or failure
changeKit - takes a ChangeKitMsg and client index, changes specified kit (if valid and not in production), sends StringMsg to client indicating success or failure
deleteKit - takes a DeleteKitMsg and client index, deletes kit with specified name (if exists), sends StringMsg to client indicating success or failure
listKits - takes client index and sends kitTypes to client in a KitListMsg (called when server receives a KitListMsg, but received message is not a parameter because it doesn't influence behavior of the method)
produceKits - takes a ProduceKitsMsg and client index and appends it to produceStatus (if valid) indicating that it is queued, sends StringMsg to client indicating success or failure
sendProduceStatus - takes client index and sends produceStatus to client (called when server receives a ProduceStatusMsg)

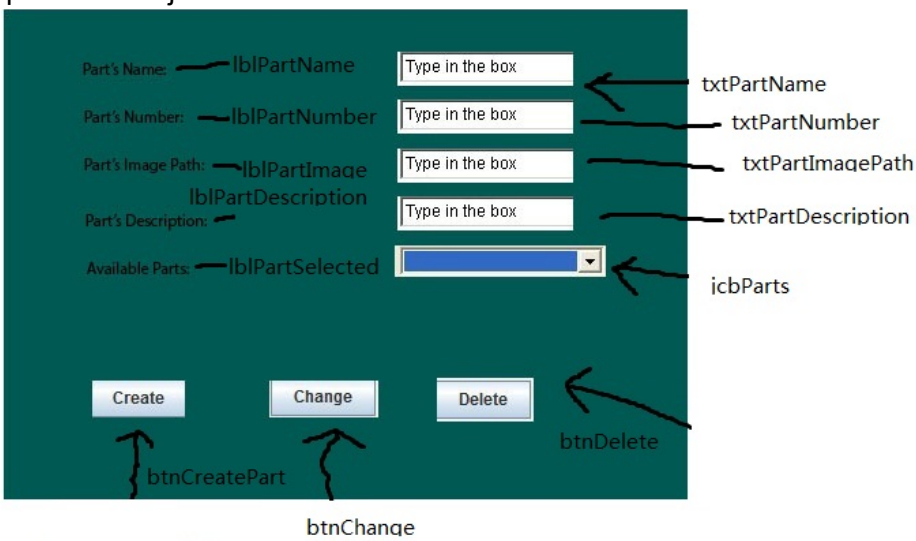
changeNormative - takes a NonNormativeMsg and client index, breaks or fixes specified item, sends StringMsg to client indicating success or failure

loadSettings - load factory state from file

saveSettings - save factory state to file

Part Manager:

Each time you see the icbXXXX means jcbXXXX in the MOCKUPS, the software paint can't separate i and j



PartClient

This class contains the main method and communicates with the server.

Member Data:

parts - ArrayList of all parts

netComm - NetComm instance to communicate with server

pnlConnect - panel to let user connect to server

pnlPartl- PartPanel for prompting user input

Methods:

msgReceived - handles message from server (takes message and NetComm that received the message)

PartPanel:

Member Data:

lblPartNumber - Label for part number

lblPartDescription - Label for part Desc

lblPartName - Label for part name

lblPartImage - Label for part image

lblPartSelected - Label for prompting the user to select a part

btnCreatePart - button for making a part

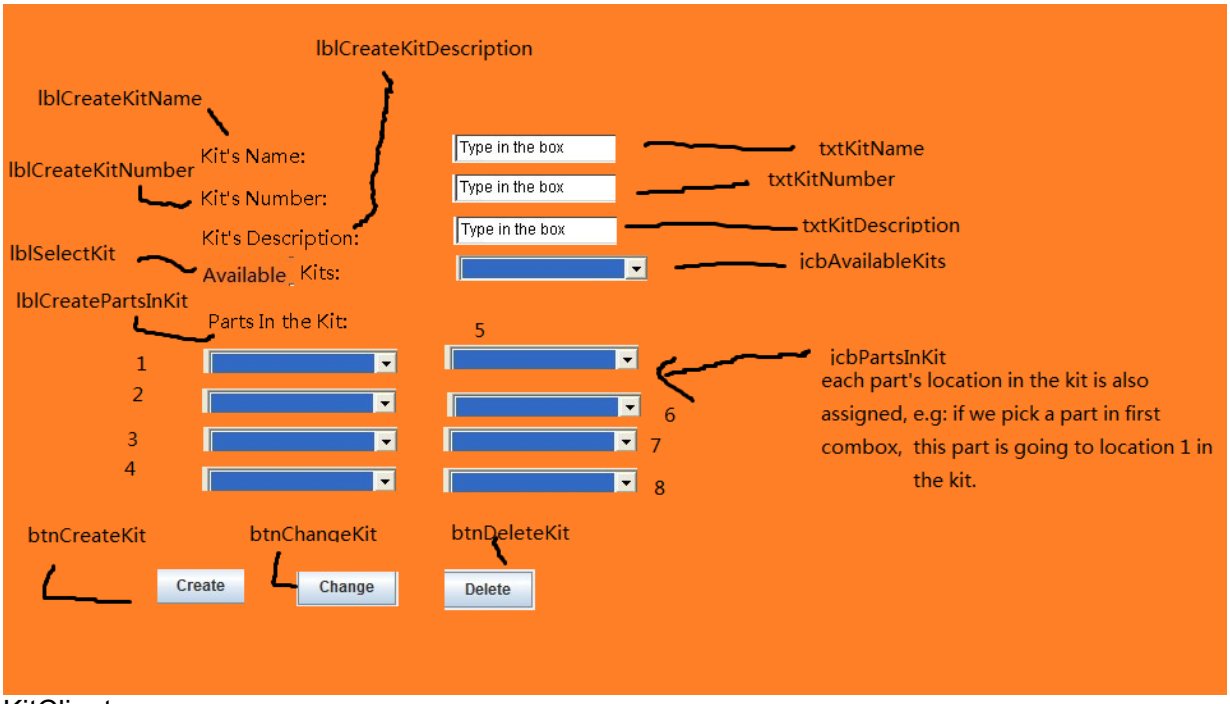
btnDelete - Delete a selected part
btnChange - Change a selected part
txtPartNumber - TextField for part number
txtPartDescription - TextField for part description
txtPartName - TextField for part name
txtPartImagePath - TextField for part image path
jcbParts - ComboBox for all of the parts

Methods:

actionPerformed() - handle the input, send any modification of the kits to server

Kit Manager:

Each time you see the icbXXXX means jcbXXXX in the MOCKUPS, the software paint can't separate i and j



KitClient:

This class contains the main method and communicates with the server.

Member Data:

parts- ArrayList of all the parts
kits - ArrayList of all the kits
netComm- socket class to communicate with server
pnlConnect - panel to let user connect to server
pnlKit- KitPanel for prompting user input

Methods:

getKitDescription() – get the description of the kit
geKitNumber() – get the number of the kit
getKitName() – get the name of the kit
getPartsInKit() - get the arraylist of parts in the kit
msgReceived - handles message from server (takes message and NetComm that received the message)

KitPanel:

user can create a new kit, or order a existing kit.

Member Data:

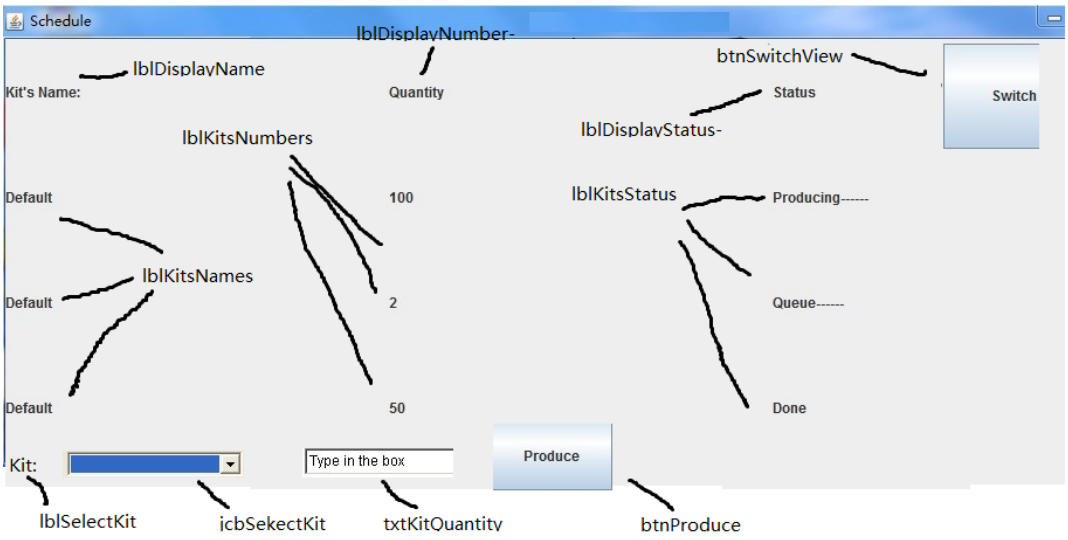
lblCreateKitNumber - Label for prompting user the number of the new kit
lblCreateKitDescription - Label for kit Desc
lblCreateKitName - Label for kit name
lblCreatePartsInKit - Label for parts in a kit
lblSelectKit - Label for prompting user the name of a kit he wants to change or delete
btnDeleteKit - button for deleting a kit
btnCreateKit- button for Creating a new kit
btnChangeKit - button for changing a selected kit
jcbPartsInKit - ArrayList of ComboBox for selecting parts in a kit when creating or modifing a kit. (some of them can be empty, but parts in a kit at most can be 8)
txtKitNumber - TextField for kit number
txtKitDescription - TextField for kit description
txtKitName - TextField for kit name
jcbAvailableKits - ComboBox for the avaiable kits

Methods:

actionPerformed() - handle the input, send any modification of the kits to server

Factory Production Manager:

Each time you see the icbXXXX means jcbXXXX in the MOCKUPS, the software paint can't separate i and j



FPClient:

This class contains the main method and communicates with the server.

Member Data:

pnlConnect - panel to let user connect to server
parts - ArrayList of all possible parts
kits - ArrayList of all possible kits
netComm- socket class to communicate with server, need to update the parts and kits
pnlFPPanel - Panel for showing the schedule
jcbSekectKit - Combobox for displaying what kits can be make
txtKitQuantity - TextField for enter kit's quantity
lblSelectKit - Label for user to select a kit
lblDisplayName - Label for display name
lblDisplayNumber- Label for display number
lblDisplayStatus- Label for display status
lblKitsNames - arraylist of kit's label
lblKitsNumbers - arraylist of label of kits' quantity
lblKitsStatus - arraylist of label of kits' status
btnSwitchView - switch button for displaying the graphical view of factory
btnProduce - Button for produce the kits
schedule<string kit's name, int quantity> - TreeMap schedule to classify kits and their quantity

Methods:

getKits() – get kits from the server
getParts() – get parts from the server
DeleteProducedKits(ArrayList <Kit> kits) – take the arraylist of the available kits, check their status, if it is produced or in process, remove it from the arraylist.

writeSchdule() - Classlify the kits and write them into the labels on the pnlFPPanel
msgReceived - handles message from server (takes message and NetComm that received the message)
actionPerformed - receives action events

Lane Manager:

FeederClass

A feeder object.

Member Data:

diverter - boolean variable for which side of lane items go.
partsLow - boolean variable for when parts are low.
amount - int variable for amount of parts in feeder.

Methods:

setPartsLow() - makes partsLow true
setPartsUnlow() - makes partsLow false
checkIfLow() - check if there are parts in feeder, (return partsLow)
changeLane() - changes the lane parts are going. (diverter = !diverter)
getLane() - returns what lane parts are going.
(Diverter, false is lane 1, true is lane 2)

LaneClass

A lane object.

Member Data:

GUILane1 - first GUILane
GUILane2 - second GUILane
velocity - int variable for speed of the lane.
laneOn - boolean variable for when the lane is on.
movingItems - ArrayList of X parts.
vibration - int variable for how much lane is vibrating.

Methods:

isLaneOn() - checks if lane is on, returns LaneOn
amplifyVibration() - increases vibration of lane
lowerVibration() - decreases vibration of lane
removeItem() - remove a part from MovingItems
addItem() - add a part to MovingItems
getSpeed() - return velocity of the lane

NestClass

A Nest object.

Member Data:

nestedItems - ArrayList of X parts.
nestFull - boolean variable for when nest is full.
limit - int variable for number of parts the nest can hold.

switch - boolean for when nest is up or down

Methods:

isNestFull() - checks if the nest is full, return NestFull
addPart() - adds a part to the NestedItems
removePart() - removes a part from NestedItems
dumpNest() - removes all parts from NestedItems
flipSwitch() - flips the switch (switch = !switch)

WholeLaneClass

Class with a feeder, lane, and nest as a set.
Member Data:

myFeeder - Feeder object for the lane.
myLane - Lane object for the lane.
myTopNest - Top nest object for lane.
myBottomNest - Bottom nest object for lane.

Methods:

turnOnLane() - turns its lane on
isFeederLow() - checks if feeder is low
isTopNestFull() - checks if top nest is full
isBottomNestFull() - checks if bottom nest is full
vibrateLane() - increases vibration of the lane
unvibrateLane() - decreases vibration of the lane
takePicOfNests() - takes a picture of both nests
flipNestOneSwitch() - flips Nest 1's switch
flipNestTwoSwitch() - flips Nest 2's switch

LaneClient

This class shows all the feeder, lanes, nests operating.
Member Data:

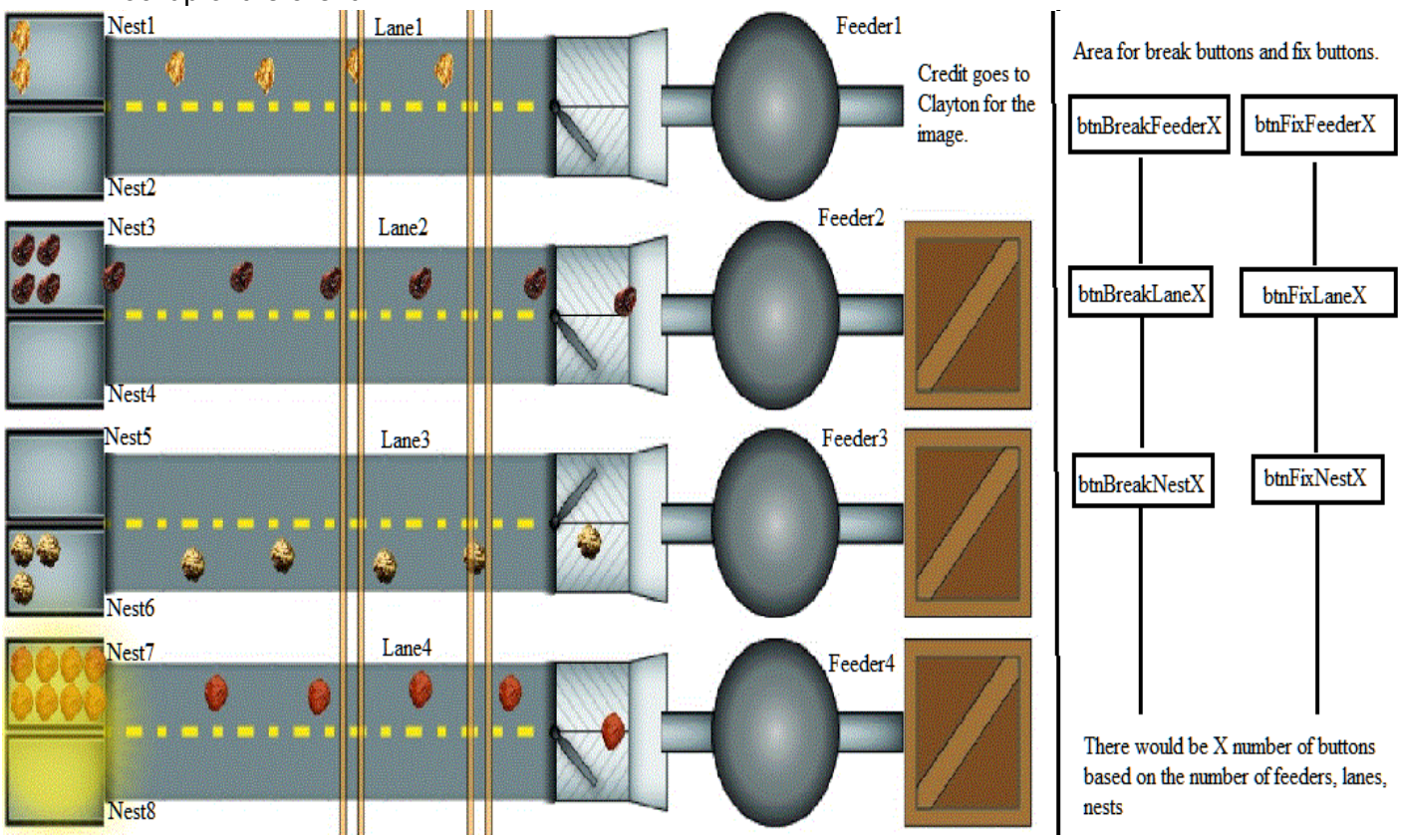
Lanes - ArrayList of 4 WholeLanes.
pnlBreakThings - Panel for breaking things
netComm- socket to communicate with the server

Methods:

takePictureOfLane1Nests() - takes a picture of lane 1's nests if possible
takePictureOfLane2Nests() - takes a picture of lane 2's nests if possible
takePictureOfLane3Nests() - takes a picture of lane 3's nests if possible
takePictureOfLane4Nests() - takes a picture of lane 4's nests if possible
getPartFromNest1() - gets a part from nest1.
getPartFromNest2() - gets a part from nest2.
getPartFromNest3() - gets a part from nest3.
getPartFromNest4() - gets a part from nest4.
getPartFromNest5() - gets a part from nest5.
getPartFromNest6() - gets a part from nest6.

getPartFromNest7() - gets a part from nest7.
getPartFromNest8() - gets a part from nest8.
feedFeeder1() - fill feeder1
feedFeeder2() - fill feeder2
feedFeeder3() - fill feeder3
feedFeeder4() - fill feeder4
divertFeeder1() - switches the position of feeder 1's diverter
divertFeeder2() - switches the position of feeder 2's diverter
divertFeeder3() - switches the position of feeder 3's diverter
divertFeeder4() - switches the position of feeder 4's diverter
fixLane1() - attempts to fix lane 1 by increasing vibration
fixLane2() - attempts to fix lane 2 by increasing vibration
fixLane3() - attempts to fix lane 3 by increasing vibration
fixLane4() - attempts to fix lane 4 by increasing vibration
paintWholeLanes() - paints all feeders, lanes, nests, parts

Mockup of the client:



BreakThings

Panel with options for breaking parts of the lanes

Member Data:

btnBreakFeeder1 - the button prevents feeder1 from working
btnBreakFeeder2 - the button prevents feeder2 from working

btnBreakFeeder3 - the button prevents feeder3 from working
btnBreakFeeder4 - the button prevents feeder4 from working
btnBreakLane1 - the button causes lane1 to stop
btnBreakLane2 - the button causes lane2 to stop
btnBreakLane3 - the button causes lane3 to stop
btnBreakLane4 - the button causes lane4 to stop
btnBreakNest1 - the button causes nest1 to spill
btnBreakNest2 - the button causes nest1 to spill
btnBreakNest3 - the button causes nest1 to spill
btnBreakNest4 - the button causes nest1 to spill
btnBreakNest5 - the button causes nest1 to spill
btnBreakNest6 - the button causes nest1 to spill
btnBreakNest7 - the button causes nest1 to spill
btnBreakNest8 - the button causes nest1 to spill
btnFixFeeder1 - the button fixes feeder1
btnFixFeeder2 - the button fixes feeder2
btnFixFeeder3 - the button fixes feeder3
btnFixFeeder4 - the button fixes feeder4
btnFixLane1 - the button fixes lane1
btnFixLane2 - the button fixes lane2
btnFixLane3 - the button fixes lane3
btnFixLane4 - the button fixes lane4
btnFixNest1 - the button fixes nest1
btnFixNest2 - the button fixes nest2
btnFixNest3 - the button fixes nest3
btnFixNest4 - the button fixes nest4
btnFixNest5 - the button fixes nest5
btnFixNest6 - the button fixes nest6
btnFixNest7 - the button fixes nest7
btnFixNest8 - the button fixes nest8
lblFeeder1 - shown next to feeder1
lblFeeder2 - shown next to feeder2
lblFeeder3 - shown next to feeder3
lblFeeder4 - shown next to feeder4
lblLane1 - shown next to lane1
lblLane2 - shown next to lane2
lblLane3 - shown next to lane3
lblLane4 - shown next to lane4
lblNest1 - shown next to nest1
lblNest2 - shown next to nest2
lblNest3 - shown next to nest3
lblNest4 - shown next to nest4
lblNest5 - shown next to nest5
lblNest6 - shown next to nest6

lblNest7 - shown next to nest7
lblNest8 - shown next to nest8

Methods:

actionListener - sends status of feeders, lanes, nests to server

Kit Assembly Manager:

KitClient

This class contains the main method and communicates with the server.

Member Data:

kits - ArrayList of currently queued kits
netComm (socket) - instance of NetComm class for communication with the server.
kitRobot - instance of a kit robot
partRobot - instance of a part robot
pnlKitAssembly - JPanel to add the KitAssemblyPanel to
pnlSwitchPanelButton - JPanel for a button to switch to the non-normative controls panel
kitAssemblyPanel - declaration of instance of KitAssemblyPanel
kitAssemblyBreakPanel - declaration of instance of KitAssemblyBreakPanel

Methods:

sendKitRobotTask(startStation, endStation, time) - sends task to kit robot.
sendPartRobotTask(nestNumber, kitStation, time) - sends task to part robot.
getKitRobotPos - returns position of kit robot
getPartRobotPos - returns position of part robot

KitAssemblyPanel

This class is a JPanel that displays the kitting stand, the kit robot, the kit delivery station, and the part robot.

Member Data:

Methods:

paintKitAssemblyPanel - paints background images and instructs objects to repaint themselves.
takePicture - takes a picture

KitAssemblyBreakPanel

This class allows the user to break the kit robot, part robot, and kit delivery station

Member Data:

lblKitRobot - JLabel for kit robot
lblPartRobot - JLabel for part robot
lblKitDelivery - JLabel for kit delivery station
radioBreakKitRobot - JRadioButton to break the kit robot

radioFixKitRobot - JRadioButton to fix the kit robot
radioBreakPartRobot - JRadioButton to break the part robot
radioFixPartRobot - JRadioButton to fix the part robot
radioBreakKitDelivery - JRadioButton to break the kit delivery station
radioFixKitDelivery - JRadioButton to fix the kit delivery station

Methods:

actionListener - send message to server via netComm updating the status of the kit robot, part robot, or kit delivery station.

Gantry Robot Manager:

GantryClient

This class contains the main method and communicates with the server.

Member Data:

netComm- socket class to communicate with server

Methods:

main- remains in an infinite while-loop polling server commands
updateInfo - notifies server of any and all changes to bins and gantry

GantryPanel

This class is a JPanel that displays a wide view of the gantry robot

Member Data:

bins- ArrayList of bins on the floor
gantry - gantry robot
allLocations - ArrayList of all possible locations of bins
originalLocations - ArrayList of bins' original location before being moved around (subset of allLocations)
purgeLocations - arraylist of purge stations (subset of allLocations)
tempLocations - arraylist of temporary locations (subset of allLocations)

Methods:

paintGantryPanel - paints background images and instructs objects to repaint themselves.
takePicture - takes a picture

Helper Classes:

NetComm

encapsulates networked communication with a single client or server

Member Data (all private):

node - object that is notified when a new message is received
socket - client socket that is endpoint for network communication
in - ObjectInputStream that reads messages related to this client over the network

out - ObjectOutputStream that writes messages related to this client over the network

Methods:

NetComm - constructor that initializes communication with given node (that implements Networked) and given Socket; throws IOException if fails

write - write specified object to output stream

close - close connection

NetCommReader

inner class of NetComm that runs on a separate thread to receive messages

Methods:

run - keep polling for new messages, and forward received messages to network node (this is automatically called when thread starts)

read - returns object read from input stream, or null if no new message, or a CloseConnectionMsg if either client or server disconnected from network

ConnectPanel

panel that all client (manager) classes display to let user connect to server; this class is based on SignInPanel.java in Andrew's HW3 submission

Mockup (labeled components are described in Member Data section):

Member Data (all private):

txtServerAddress - text box to enter server domain name or IP address

btnConnect - button to connect to server

lblActionMsg - label for displaying message or error

action - reference to action listener to notify when user presses connect to server button

Methods:

ConnectPanel - constructor that sets up the panel GUI and stores reference to action listener to notify to connect to server

reset - reset text field and action message text

setActionMsg - display specified action message, allowing HTML formatting

setActionError - display specified action message in red text, allowing HTML formatting

actionPerformed - when button clicked, validate sign in info and notify parent action listener

Interfaces:

Networked

indicates that implementing class is capable of receiving messages across the network

Methods:

msgReceived - handle message received from the network (takes message and NetComm that received the message)

High-Level Architecture:

User Interfaces:

PUT MOCKUPS IN THE PANEL CLASSES. This section will be deleted before we submit the design document.

Test Cases: