Java Simulated Kitting Demo

Install

Platform prerequisites:

- Ubuntu 16.04
- Netbeans 8.2 with
- Oracle JDK version 1.8. (You will need to configure maven to use oracle maven in Netbeans.)
- The crclbase, crclutils, and rcs projects produce jar files that are used by GwendolynCrclClient and have been prebuilt and installed a libraries in the GwendolynCrclClient project. Note, the crclbase contains Java for CRCL but instead the crclbase-model which contains CRCL support for all model status reporting and inferences, is used. There is no CRCL XML decoding in the embedded kitting simulation, so this is not critical but would be for an end-to-end simulation involving CRCL command/status control.

First, clone the Gwendolyn github repository : found at https://github.com/usnistgov/gwendolyn You only need the Netbeans Projects but an end-to-end kitting simulation is included in the code (described elsewhere). Start Netbeans and select the folder GwendolynCrclClient to open the NB project and right click on the project name to Clean and Build, and you are ready to run.

The Java embedded kitting simulation relies on CRCL and posemath utilities produced by NIST and contained in jar files. There is Javadoc documentation describing the CRCL and posemath which can be found here:

The GwendolynCrclClient also has Javadoc but it is not online. You can generate it in Netbeans by right clicking on the GwendolynCrclClient project name and selecting the command: Generate Javadoc.

Configuration

The GwendolynCrclClient is configured to be self-contained as is. The variable

```
class  Globals
…
public static boolean bLoopback = true
```

is the flag that tell the application that it is an embedded CRCL simulation, with no outside socket interface to a CRCL server. Model setup and inferences are all embedded within the Java code.

In Netbeans, choose menu: Debug-> Debug Project (GwendolynCrclClient) and you should see output if you select the Output tab closely matching the output given in the next section.

Input

The initial kitting scene is hard coded in the embedded CRCL loopback simulation. The following is hard coded as the kits, supply vessels, and gears in the kitting demo. Each model has a name (which is a combination of a sku type and an trailing numeric identifier) as well as a position.

```
sku_kit_m2l1_vessel14 at 0.40,  -1.05, 0.92,0.000,0.000,-0.720,0.694
sku_kit_m2l1_vessel15 at 0.18,  -1.05, 0.92,0.000,0.000,-0.720,0.694
sku_medium_gear_vessel16 at 0.19, -1.24, 0.92,0.000,0.000,0.017,1.000
sku_part_medium_gear17 at 0.23, -1.20, 0.92,-0.011,-0.003,0.022,1.000
sku_part_medium_gear18 at 0.15, -1.20, 0.92,-0.001,-0.001,0.017,1.000
sku_part_medium_gear19 at 0.15, -1.28, 0.92,0.001,-0.003,0.018,1.000
sku_part_medium_gear20 at 0.23, -1.28, 0.92,-0.002,0.001,0.012,1.000
sku_large_gear_vessel21 at 0.39,  -1.26, 0.92,0.000,0.000,0.721,0.693
```

```
sku_part_large_gear22 at 0.39, -1.21, 0.92,0.002,-0.002,0.016,1.000
sku_part_large_gear23 at 0.39, -1.32, 0.92,-0.002,-0.001,0.188,0.982
```

This kitting setup corresponds to the following diagram
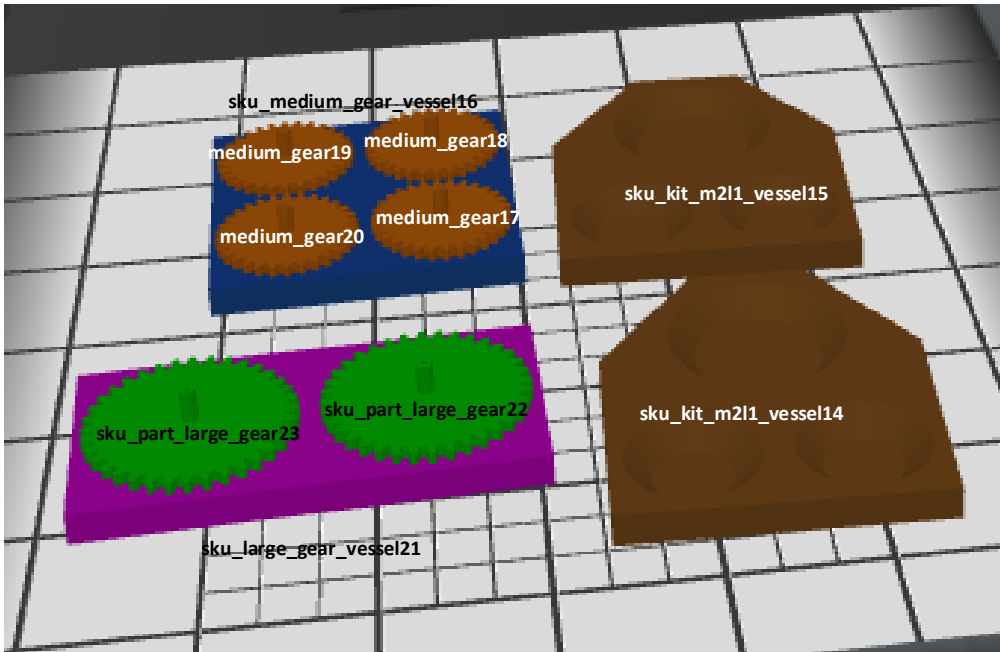
Included in the hard coding setup is the definition of all the types of objects in the kitting scene; gears, trays, and slots. For example, the following shows the physical relationships for the medium gear supply tray:
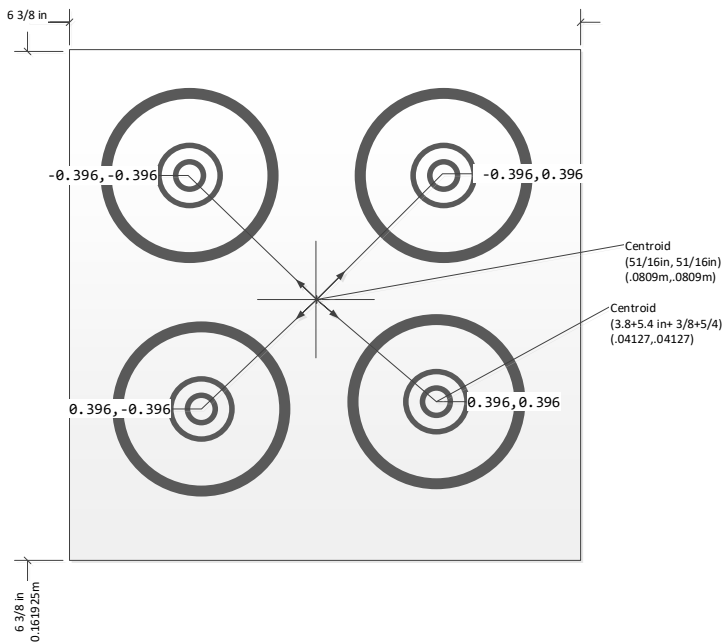
Medium Vessel

Name	Type	State	Distance from Centroid
Slot1	Medium Gear Slot	Filled/ Open	0.0396, 0.0396, 0.0
Slot2	Medium Gear Slot	Filled/ Open	-0.0396, 0.0396, 0.0
Slot3	Medium Gear Slot	Filled/ Open	0.0396, -0.0396,0.0

Slot4	Medium Gear Slot	Filled/ Open	-0.0396, -0.0396,0.0

Given this knowledge, inferences about the the state of tray slots and gear states are inferred from the scene.

Output

Log of Simulated Kitting Demo in Java with hard coded kitting scene from agility lab, mathematical reasoned gear pick and place repositioning, and inferencing of kitting free gears and open slots embedded in Java code.

The Java console output:

```
debug:

issueCrclCommand class crcl.base.MoveToType 0.3990, -0.0600, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3990, -0.0600, 0.0008 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType close
Closest Gear to commanded locationsku_part_medium_gear17


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.3990, -0.0600, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.6254,  0.1280, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.6254,  0.1280, 0.0208 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType open gear new location 0.4564, -
1.0120,  0.9200  0.0000,  0.0000, 0.0000, 1.0000, New kitting scene inferences after gear move
sku_kit_m2l1_vessel14 at  0.4000, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
    slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
    slot2 sku_part_medium_gear open ( 0.4535,-1.0920, 0.9200)
    slot3 sku_part_large_gear open ( 0.3600,-1.0485, 0.9200)
sku_kit_m2l1_vessel15 at  0.1800, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
    slot1 sku_part_medium_gear open ( 0.2364,-1.0120, 0.9200)
    slot2 sku_part_medium_gear open ( 0.2335,-1.0920, 0.9200)
    slot3 sku_part_large_gear open ( 0.1400,-1.0485, 0.9200)
sku_medium_gear_vessel16 at  0.1900, -1.2400,  0.9200  0.0000, 0.0000, 0.0170,  0.9999,
    slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
    slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.1491,-1.2018,
0.9200)
    slot3 sku_part_medium_gear sku_part_medium_gear20 ( 0.2309,-1.2782,
0.9200)
    slot4 sku_part_medium_gear sku_part_medium_gear19 ( 0.1518,-1.2809,
0.9200)
sku_part_medium_gear17 at  0.4564, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
    In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at  0.1500, -1.2000,  0.9200 -0.0010, -0.0000, 0.0170,  0.9999,
    In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at  0.1500, -1.2800,  0.9200  0.0010, -0.0030, 0.0180,  0.9998,
    In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at  0.2300, -1.2800,  0.9200 -0.0020, 0.0010, 0.0120,  0.9999,
    In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at  0.3900, -1.2600,  0.9200  0.0000, 0.0000, 0.7210,  0.6930,
    slot1 sku_part_large_gear sku_part_large_gear23 ( 0.3922,-1.3150,
```

```
0.9200)
     slot2 sku_part_large_gear sku_part_large_gear22 ( 0.3878,-1.2050,
0.9200)
sku_part_large_gear22 at  0.3900, -1.2100,  0.9200  0.0020, -0.0020, 0.0160,  0.9999,
     In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at  0.3900, -1.3200,  0.9200 -0.0020, -0.0010, 0.1880,  0.9822,
     In: sku_large_gear_vessel21(slot1)


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.6254,  0.1280, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3190, -0.0600, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3190, -0.0600, 0.0008 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType close
Closest Gear to commanded locationsku_part_medium_gear18


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.3190, -0.0600, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.6225,  0.0480, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.6225,  0.0480, 0.0208 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType open gear new location 0.4535, -
1.0920,  0.9200  0.0000,  0.0000, 0.0000, 1.0000, New kitting scene inferences after gear move
sku_kit_m2l1_vessel14 at  0.4000, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
     slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
     slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.4535,-1.0920,
0.9200)
     slot3 sku_part_large_gear open ( 0.3600,-1.0485, 0.9200)
sku_kit_m2l1_vessel15 at  0.1800, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
     slot1 sku_part_medium_gear open ( 0.2364,-1.0120, 0.9200)
     slot2 sku_part_medium_gear open ( 0.2335,-1.0920, 0.9200)
     slot3 sku_part_large_gear open ( 0.1400,-1.0485, 0.9200)
sku_medium_gear_vessel16 at  0.1900, -1.2400,  0.9200  0.0000, 0.0000, 0.0170,  0.9999,
     slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
     slot2 sku_part_medium_gear open ( 0.1491,-1.2018, 0.9200)
     slot3 sku_part_medium_gear sku_part_medium_gear20 ( 0.2309,-1.2782,
0.9200)
     slot4 sku_part_medium_gear sku_part_medium_gear19 ( 0.1518,-1.2809,
0.9200)
sku_part_medium_gear17 at  0.4564, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at  0.4535, -1.0920,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at  0.1500, -1.2800,  0.9200  0.0010, -0.0030, 0.0180,  0.9998,
     In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at  0.2300, -1.2800,  0.9200 -0.0020, 0.0010, 0.0120,  0.9999,
     In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at  0.3900, -1.2600,  0.9200  0.0000, 0.0000, 0.7210,  0.6930,
     slot1 sku_part_large_gear sku_part_large_gear23 ( 0.3922,-1.3150,
0.9200)
     slot2 sku_part_large_gear sku_part_large_gear22 ( 0.3878,-1.2050,
0.9200)
sku_part_large_gear22 at  0.3900, -1.2100,  0.9200  0.0020, -0.0020, 0.0160,  0.9999,
     In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at  0.3900, -1.3200,  0.9200 -0.0020, -0.0010, 0.1880,  0.9822,
```

```
     In: sku_large_gear_vessel21(slot1)


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.6225,   0.0480, 0.0608 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.5590, -0.1800, 0.0408 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.5590, -0.1800, 0.0008 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType close
Closest Gear to commanded locationsku_part_large_gear23


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.5590, -0.1800, 0.0408 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.5290,   0.0915, 0.0608 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.5290,   0.0915, 0.0208 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType open gear new location 0.3600, -
1.0485,   0.9200  0.0000,   0.0000, 0.0000, 1.0000, New kitting scene inferences after gear move
sku_kit_m2l1_vessel14 at   0.4000, -1.0500,   0.9200  0.0000, 0.0000, -0.7200,   0.6940,
     slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
     slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.4535,-1.0920,
0.9200)
     slot3 sku_part_large_gear sku_part_large_gear23 ( 0.3600,-1.0485,
0.9200)
sku_kit_m2l1_vessel15 at   0.1800, -1.0500,   0.9200  0.0000, 0.0000, -0.7200,   0.6940,
     slot1 sku_part_medium_gear open ( 0.2364,-1.0120, 0.9200)
     slot2 sku_part_medium_gear open ( 0.2335,-1.0920, 0.9200)
     slot3 sku_part_large_gear open ( 0.1400,-1.0485, 0.9200)
sku_medium_gear_vessel16 at   0.1900, -1.2400,   0.9200  0.0000, 0.0000, 0.0170,   0.9999,
     slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
     slot2 sku_part_medium_gear open ( 0.1491,-1.2018, 0.9200)
     slot3 sku_part_medium_gear sku_part_medium_gear20 ( 0.2309,-1.2782,
0.9200)
     slot4 sku_part_medium_gear sku_part_medium_gear19 ( 0.1518,-1.2809,
0.9200)
sku_part_medium_gear17 at   0.4564, -1.0120,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
     In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at   0.4535, -1.0920,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
     In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at   0.1500, -1.2800,   0.9200  0.0010, -0.0030, 0.0180,   0.9998,
     In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at   0.2300, -1.2800,   0.9200 -0.0020, 0.0010, 0.0120,   0.9999,
     In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at   0.3900, -1.2600,   0.9200  0.0000, 0.0000, 0.7210,   0.6930,
     slot1 sku_part_large_gear open ( 0.3922,-1.3150, 0.9200)
     slot2 sku_part_large_gear sku_part_large_gear22 ( 0.3878,-1.2050,
0.9200)
sku_part_large_gear22 at   0.3900, -1.2100,   0.9200  0.0020, -0.0020, 0.0160,   0.9999,
     In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at   0.3600, -1.0485,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
     In: sku_large_gear_vessel21(slot1)



issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.5290,   0.0915, 0.0608 1.0000,   0.0000,   0.0000,   0.0000,
```

```
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3990, -0.1400, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3990, -0.1400, 0.0008 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType close
Closest Gear to commanded locationsku_part_medium_gear20


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.3990, -0.1400, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.4054,  0.1280, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.4054,  0.1280, 0.0208 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType open gear new location 0.2364, -
1.0120,  0.9200  0.0000,  0.0000, 0.0000, 1.0000, New kitting scene inferences after gear move
sku_kit_m2l1_vessel14 at  0.4000, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
    slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
    slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.4535,-1.0920,
0.9200)
    slot3 sku_part_large_gear sku_part_large_gear23 ( 0.3600,-1.0485,
0.9200)
sku_kit_m2l1_vessel15 at  0.1800, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
    slot1 sku_part_medium_gear sku_part_medium_gear20 ( 0.2364,-1.0120,
0.9200)
    slot2 sku_part_medium_gear open ( 0.2335,-1.0920, 0.9200)
    slot3 sku_part_large_gear open ( 0.1400,-1.0485, 0.9200)
sku_medium_gear_vessel16 at  0.1900, -1.2400,  0.9200  0.0000, 0.0000, 0.0170,  0.9999,
    slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
    slot2 sku_part_medium_gear open ( 0.1491,-1.2018, 0.9200)
    slot3 sku_part_medium_gear open ( 0.2309,-1.2782, 0.9200)
    slot4 sku_part_medium_gear sku_part_medium_gear19 ( 0.1518,-1.2809,
0.9200)
sku_part_medium_gear17 at  0.4564, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
    In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at  0.4535, -1.0920,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
    In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at  0.1500, -1.2800,  0.9200  0.0010, -0.0030, 0.0180,  0.9998,
    In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at  0.2364, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
    In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at  0.3900, -1.2600,  0.9200  0.0000, 0.0000, 0.7210,  0.6930,
    slot1 sku_part_large_gear open ( 0.3922,-1.3150, 0.9200)
    slot2 sku_part_large_gear sku_part_large_gear22 ( 0.3878,-1.2050,
0.9200)
sku_part_large_gear22 at  0.3900, -1.2100,  0.9200  0.0020, -0.0020, 0.0160,  0.9999,
    In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at  0.3600, -1.0485,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
    In: sku_large_gear_vessel21(slot1)



issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.4054,  0.1280, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3190, -0.1400, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3190, -0.1400, 0.0008 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType close
```

```
Closest Gear to commanded locationsku_part_medium_gear19


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.3190, -0.1400, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.4025,  0.0480, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.4025,  0.0480, 0.0208 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType open gear new location 0.2335, -
1.0920,  0.9200  0.0000,  0.0000, 0.0000, 1.0000, New kitting scene inferences after gear move
sku_kit_m2l1_vessel14 at  0.4000, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
     slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
     slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.4535,-1.0920,
0.9200)
     slot3 sku_part_large_gear sku_part_large_gear23 ( 0.3600,-1.0485,
0.9200)
sku_kit_m2l1_vessel15 at  0.1800, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
     slot1 sku_part_medium_gear sku_part_medium_gear20 ( 0.2364,-1.0120,
0.9200)
     slot2 sku_part_medium_gear sku_part_medium_gear19 ( 0.2335,-1.0920,
0.9200)
     slot3 sku_part_large_gear open ( 0.1400,-1.0485, 0.9200)
sku_medium_gear_vessel16 at  0.1900, -1.2400,  0.9200  0.0000, 0.0000, 0.0170,  0.9999,
     slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
     slot2 sku_part_medium_gear open ( 0.1491,-1.2018, 0.9200)
     slot3 sku_part_medium_gear open ( 0.2309,-1.2782, 0.9200)
     slot4 sku_part_medium_gear open ( 0.1518,-1.2809, 0.9200)
sku_part_medium_gear17 at  0.4564, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at  0.4535, -1.0920,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at  0.2335, -1.0920,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at  0.2364, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at  0.3900, -1.2600,  0.9200  0.0000, 0.0000, 0.7210,  0.6930,
     slot1 sku_part_large_gear open ( 0.3922,-1.3150, 0.9200)
     slot2 sku_part_large_gear sku_part_large_gear22 ( 0.3878,-1.2050,
0.9200)
sku_part_large_gear22 at  0.3900, -1.2100,  0.9200  0.0020, -0.0020, 0.0160,  0.9999,
     In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at  0.3600, -1.0485,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_large_gear_vessel21(slot1)



issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.4025,  0.0480, 0.0608 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.5590, -0.0700, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.5590, -0.0700, 0.0008 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType close
Closest Gear to commanded locationsku_part_large_gear22


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.5590, -0.0700, 0.0408 1.0000,  0.0000,  0.0000,  0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
```

```
issueCrclCommand class crcl.base.MoveToType 0.3090,   0.0915, 0.0608 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.MoveToType 0.3090,   0.0915, 0.0208 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1
issueCrclCommand class crcl.base.SetEndEffectorType open gear new location 0.1400, -
1.0485,   0.9200  0.0000,   0.0000, 0.0000, 1.0000, New kitting scene inferences after gear move
sku_kit_m2l1_vessel14 at   0.4000, -1.0500,   0.9200  0.0000, 0.0000, -0.7200,   0.6940,
    slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
    slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.4535,-1.0920,
0.9200)
    slot3 sku_part_large_gear sku_part_large_gear23 ( 0.3600,-1.0485,
0.9200)
sku_kit_m2l1_vessel15 at   0.1800, -1.0500,   0.9200  0.0000, 0.0000, -0.7200,   0.6940,
    slot1 sku_part_medium_gear sku_part_medium_gear20 ( 0.2364,-1.0120,
0.9200)
    slot2 sku_part_medium_gear sku_part_medium_gear19 ( 0.2335,-1.0920,
0.9200)
    slot3 sku_part_large_gear sku_part_large_gear22 ( 0.1400,-1.0485,
0.9200)
sku_medium_gear_vessel16 at   0.1900, -1.2400,   0.9200  0.0000, 0.0000, 0.0170,   0.9999,
    slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
    slot2 sku_part_medium_gear open ( 0.1491,-1.2018, 0.9200)
    slot3 sku_part_medium_gear open ( 0.2309,-1.2782, 0.9200)
    slot4 sku_part_medium_gear open ( 0.1518,-1.2809, 0.9200)
sku_part_medium_gear17 at   0.4564, -1.0120,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
    In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at   0.4535, -1.0920,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
    In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at   0.2335, -1.0920,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
    In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at   0.2364, -1.0120,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
    In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at   0.3900, -1.2600,   0.9200  0.0000, 0.0000, 0.7210,   0.6930,
    slot1 sku_part_large_gear open ( 0.3922,-1.3150, 0.9200)
    slot2 sku_part_large_gear open ( 0.3878,-1.2050, 0.9200)
sku_part_large_gear22 at   0.1400, -1.0485,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
    In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at   0.3600, -1.0485,   0.9200  0.0000, 0.0000, 0.0000,   1.0000,
    In: sku_large_gear_vessel21(slot1)


issueCrclCommand class crcl.base.DwellType:2.0
issueCrclCommand class crcl.base.MoveToType 0.3090,   0.0915, 0.0608 1.0000,   0.0000,   0.0000,   0.0000,
issueCrclCommand class crcl.base.DwellType:0.1 BUILD SUCCESSFUL (total time: 1 minute 39 seconds)
```

Explanation of the Kitting inferences:

For each kit, supply vessel, and gear, knowledge inferences are produced by studying the relationship of the gears and trays. Below is a diagnostic dump of the inferred knowledge. For a kit or supply tray (e.g., kit= sku_kit_m2l1_vessel14 while gear supply vessel= sku_medium_gear_vessel16) the Gazebo derived model knowledge gives the location (as well as orientation) of the kitting object. Inferences follow and are indented to display the inferred knowledge about the slots contained in the tray and their state. The state shows whether the tray is open or occupied. If occupied, the name of the gear in the slot (e.g., sku_part_medium_gear17) is given. If unoccupied, "open" is designated as the name. This information is inferred by knowing the reoriented location of the slot (based on the tray orientation) and whether there

is a gear close to this location. If a gear is nearby, it is inferred to be in the slot. If no gear is near, then the slot is "open". Of note, each slot inference also contains the reoriented location of the slot in world coordinates so this is helpful knowledge. All shapes are represented in world coordinates but must be transformed into the robot coordinate system to be useful. Gears also have inferences (more informative and not important for solving the kitting problem) that give the tray (parent) and the slot where the gear is located. Again, the gear inference are produced by studying the location of the gear and the location of a tray and a slot. If close enough, the gear is inferred to be resident in the slot.

```
inferences after gear move
sku_kit_m2l1_vessel14 at  0.4000, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
     slot1 sku_part_medium_gear sku_part_medium_gear17 ( 0.4564,-1.0120,
0.9200)
     slot2 sku_part_medium_gear open ( 0.4535,-1.0920, 0.9200)
     slot3 sku_part_large_gear open ( 0.3600,-1.0485, 0.9200)
sku_kit_m2l1_vessel15 at  0.1800, -1.0500,  0.9200  0.0000, 0.0000, -0.7200,  0.6940,
     slot1 sku_part_medium_gear open ( 0.2364,-1.0120, 0.9200)
     slot2 sku_part_medium_gear open ( 0.2335,-1.0920, 0.9200)
     slot3 sku_part_large_gear open ( 0.1400,-1.0485, 0.9200)
sku_medium_gear_vessel16 at  0.1900, -1.2400,  0.9200  0.0000, 0.0000, 0.0170,  0.9999,
     slot1 sku_part_medium_gear open ( 0.2282,-1.1991, 0.9200)
     slot2 sku_part_medium_gear sku_part_medium_gear18 ( 0.1491,-1.2018,
0.9200)
     slot3 sku_part_medium_gear sku_part_medium_gear20 ( 0.2309,-1.2782,
0.9200)
     slot4 sku_part_medium_gear sku_part_medium_gear19 ( 0.1518,-1.2809,
0.9200)
sku_part_medium_gear17 at  0.4564, -1.0120,  0.9200  0.0000, 0.0000, 0.0000,  1.0000,
     In: sku_medium_gear_vessel16(slot1)
sku_part_medium_gear18 at  0.1500, -1.2000,  0.9200 -0.0010, -0.0000, 0.0170,  0.9999,
     In: sku_medium_gear_vessel16(slot2)
sku_part_medium_gear19 at  0.1500, -1.2800,  0.9200  0.0010, -0.0030, 0.0180,  0.9998,
     In: sku_medium_gear_vessel16(slot4)
sku_part_medium_gear20 at  0.2300, -1.2800,  0.9200 -0.0020, 0.0010, 0.0120,  0.9999,
     In: sku_medium_gear_vessel16(slot3)
sku_large_gear_vessel21 at  0.3900, -1.2600,  0.9200  0.0000, 0.0000, 0.7210,  0.6930,
     slot1 sku_part_large_gear sku_part_large_gear23 ( 0.3922,-1.3150,
0.9200)
     slot2 sku_part_large_gear sku_part_large_gear22 ( 0.3878,-1.2050,
0.9200)
sku_part_large_gear22 at  0.3900, -1.2100,  0.9200  0.0020, -0.0020, 0.0160,  0.9999,
     In: sku_large_gear_vessel21(slot2)
sku_part_large_gear23 at  0.3900, -1.3200,  0.9200 -0.0020, -0.0010, 0.1880,  0.9822,
     In: sku_large_gear_vessel21(slot1)
```

Important Netbeans Build Error Fix

Netbeans projects did not build for me using maven. The answer was not apparent on the internet. The following may help.

Plugin org.apache.maven.plugins:maven-clean-plugin:2.4.1 or one of its dependencies could not be resolved: Failed to read artifact descriptor for org.apache.maven.plugins:maven-clean-plugin:jar:2.4.1: Could not transfer artifact org.apache.maven.plugins:maven-clean-plugin:pom:2.4.1 from/to central (http://repo.maven.apache.org/maven2): Failed to transfer file:
http://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.4.1/maven-clean-plugin-2.4.1.pom.
Return code is: 501 , ReasonPhrase:HTTPS Required. -> [Help 1]

To see the full stack trace of the errors, re-run Maven with the -e switch.
Re-run Maven using the -X switch to enable full debug logging.

For more information about the errors and possible solutions, please read the following articles:
[Help 1]
http://cwiki.apache.org/confluence/display/MAVEN/PluginResolutionException

FIX:

Options

General | Editor | Fonts & Colors | Keymap | Java | HTML/JS | Team | Appearance | Miscellaneous

Ant | GUI Builder | Maven | JavaFX | Java Debugger | Nashorn | Profiler

Categories:

- Execution
- Appearance
- Dependencies
- Index
- Experimental

Maven Home : /usr/share/maven
(Version: 3.3.9)

Global Execution Options:

☐ Skip Tests for any build executions not directly related to testing

Edit Global Custom Goal Definitions...

☑ Reuse Output Tabs from Finished Processes

☑ Print Maven output logging level

☑ Always Show Output

Output Tab identified by: ⦿ Project Name   ◯ Maven ArtifactId

☑ Also show active configuration

☐ Collapse folds for successfully executed mojos

Export... | Import...   OK   A