

# Radiology Clinic

## Data

Table 1: List of Global Variables

Name	Description	Initial Value
NextPatIdNum	The Id number that will be assigned to the next patient	1
NextReceptionistIdNum	The Id number that will be assigned to the next receptionist	1
NextCTMachineIdNum	The Id number that will be assigned to the next CT Machine	1
$P$	The set of all patients	$\emptyset$
$R$	The set of all receptionists	$\emptyset$
$C$	The set of all CT Machines	$\emptyset$

Table 2: List of Data Modules

Name	Source	Identification	Input	Output
PatientInterarrivalTime	Poisson Process	Parameter	Mean interarrival time	Sample from Distribution
NumReceptionists	Constant	Parameter	N/A	Value
NumCTMachines	Constant	Parameter	N/A	Value
CheckInTime	Uniform Distribution	Parameter	Min and max time	Sample from Distribution
ScanTime	Log-normal Distribution	Parameter	Mean and std. dev.	Sample from Distribution

# Components

Table 3: List of Entities

Entity	Attributes
Patient	ID State StateTimes
Receptionist	ID State StateTimes
CT Machine	ID State StateTimes

Table 4: List of Transitions

No.	Participant	From Event	To Event
1	Patient	Arrive(P)	Wait for check in.Start
2	Patient	Wait for check in.End	Check in.Start
3	Patient	Check in.End	Wait for scan.Start
4	Patient	Wait for scan.End	Scan.Start
5	Patient	Scan.End	Leave(P)
6	Receptionist	Arrive(R)	Wait for task(R).Start
7	Receptionist	Wait for task(R).End	Check in.Start
8	Receptionist	Check in.End	Wait for task(R).Start
9	Receptionist	Wait for task(R).End	Leave(R)
10	CT Machine	Arrive(CT)	Wait for task(CT).Start
11	CT Machine	Wait for task(CT).End	Scan.Start
12	CT Machine	Scan.End	Wait for task(CT).Start
13	CT Machine	Wait for task(CT).End	Leave(CT)

Table 5: Activities

Activity	Participants	Event	Type	State Change
Wait for Check In	Patient (p)	Start	Scheduled	1 <b>TRIGGER</b> OnStartWaitForCheckIn <b>WITH</b> p
		End	Controlled	
Check In	Patient (p), Receptionist (r)	Start	Controlled	1 <b>SCHEDULE</b> Check In.End at <b>TIME</b> + CheckInTime()
		End	Scheduled	1 <b>START</b> Wait <b>for</b> Scan <b>WITH</b> p 2 <b>START</b> Wait <b>for</b> Task (R) <b>WITH</b> r
Wait for Scan	Patient (p)	Start	Scheduled	
		End	Controlled	1 <b>TRIGGER</b> OnStartWaitForScan <b>WITH</b> p
Scan	Patient (p), CTMachine (c)	Start	Controlled	1 <b>SCHEDULE</b> Scan.End at <b>TIME</b> + ScanTime()
		End	Scheduled	1 <b>START</b> Leave (P) <b>WITH</b> p 2 <b>START</b> Wait <b>for</b> Task (CT) <b>WITH</b> c
Wait for Task (R)	Receptionist (r)	Start	Scheduled	1 <b>TRIGGER</b> OnStartWaitForTaskR <b>WITH</b> r
		End	Controlled	
Wait for Task (CT)	CTMachine (c)	Start	Scheduled	1 <b>TRIGGER</b> OnStartWaitForTaskCT <b>WITH</b> c
		End	Controlled	

Table 6: Events

Activity	Participants	Type	State Change
Simulation Start	-	Scheduled	1 <b>SCHEDULE</b> Arrival (R) at <b>TIME</b> 2 <b>SCHEDULE</b> Arrival (CT) at <b>TIME</b> 3 <b>SCHEDULE</b> Arrival (P) at <b>TIME</b> + PatientInterArrival()
Arrival (P)	Patient (p)	Scheduled	1 p.ID = NextPatIDNum 2 p.Priority = PatientPriority() 3 NextPatIDNum = NextPatIDNum + 1 4 <b>SCHEDULE</b> Arrival (P) at <b>TIME</b> + PatientInterArrival() 5 <b>START</b> Wait <b>for</b> Check In <b>WITH</b> p
Leave (P)	Patient (p)	Scheduled	1 Calculate statistics <b>for</b> p
Arrival (R)	Receptionist (r)	Scheduled	1 r.ID = NextReceptionistIDNum 2 NextReceptionistIDNum = NextReceptionistIDNum + 1 3 <b>IF</b> NextReceptionistIDNum <= NumReceptionists <b>THEN</b> 4 <b>SCHEDULE</b> Arrival (R) at <b>TIME</b> 5 <b>END IF</b> 6 <b>START</b> Wait <b>for</b> Task (R) <b>WITH</b> r
Leave (R)	Receptionist (r)	Scheduled	1 Calculate statistics <b>for</b> r
Arrival (CT)	CTMachine (c)	Scheduled	1 c.ID = NextCTMachineIDNum 2 NextCTMachineIDNum = NextCTMachineIDNum + 1 3 <b>IF</b> NextCTMachineIDNum <= NumCTMachines <b>THEN</b> 4 <b>SCHEDULE</b> Arrival (CT) at <b>TIME</b> 5 <b>END IF</b> 6 <b>START</b> Wait <b>for</b> Task (CT) <b>WITH</b> c
Leave (P)	CTMachine (c)	Scheduled	1 Calculate statistics <b>for</b> c

Activity Diagrams

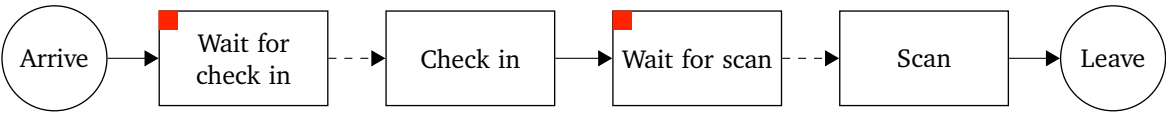


Figure 1: Patient Activity Diagram

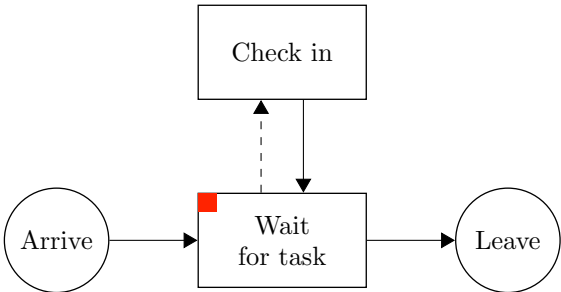


Figure 2: Receptionist Activity Diagram

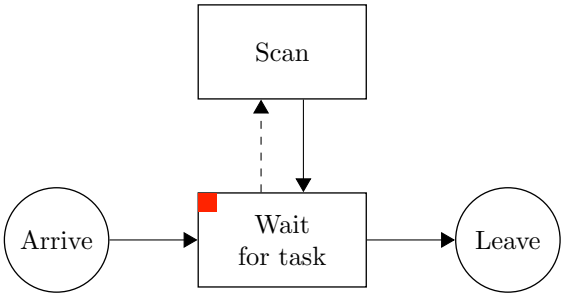


Figure 3: CT Activity Diagram

# Control Policies

Table 7: OnStartWaitForCheckIn

Triggered by: Patient p	
1	recepts = {r FOR r IN R IF r.State = "Wait_for_task_(R)"}
2	IF receipts IS NOT empty THEN
3	r_hat = argmin{r.CurrentStart FOR r IN receipts}
4	START Check In WITH p, r_hat
5	END IF

Table 8: OnStartWaitForScan

Triggered by: Patient p	
1	cts = {c FOR c IN C IF c.State = "Wait_for_task_(C)"}
2	IF cts IS NOT empty THEN
3	c_hat = argmin{c.CurrentStart FOR c IN cts}
4	START Scan WITH p, r_hat
5	END IF

Table 9: OnStartWaitForTaskR

Triggered by: Receptionist r	
1	patients = {p FOR p IN P IF p.State = "Wait_for_Check_In"}
2	IF patients IS NOT empty THEN
3	p_hat = argmin{p.CurrentStart FOR p IN patients}
4	START Check In WITH p, r_hat
5	END IF

Table 10: OnStartWaitForTaskCT

Triggered by: CTMachine c	
1	patients = {p FOR p IN P IF p.State = "Wait_for_Scan"}
2	IF patients IS NOT empty THEN
3	p_hat = argmin{p.CurrentStart FOR p IN patients}
4	START Scan WITH p, r_hat
5	END IF