The 3.8.0 release of [simmer](http://r-simmer.org/), the Discrete-Event Simulator for R, hit CRAN almost a week ago, and Windows binaries are already available. This version includes two highly requested new features that justify this second consecutive minor release.

**Attachment of precomputed data**

Until v3.7.0, the *generator* was the only means to attach data to trajectories, and it was primarily intended for dynamic generation of arrivals:

library(simmer)

set.seed(42)

hello\_sayer <- trajectory() %>%

log\_("hello!")

simmer() %>%

add\_generator("dummy", hello\_sayer, function() rexp(1, 1)) %>%

run(until=2)

## 0.198337: dummy0: hello!

## 0.859232: dummy1: hello!

## 1.14272: dummy2: hello!

## 1.18091: dummy3: hello!

## 1.65409: dummy4: hello!

## simmer environment: anonymous | now: 2 | next: 3.11771876826972

## { Monitor: in memory }

## { Source: dummy | monitored: 1 | n\_generated: 6 }

Although it may be used to attach precomputed data too, especially using the at() adaptor:

simmer() %>%

add\_generator("dummy", hello\_sayer, at(seq(0, 10, 0.5))) %>%

run(until=2)

## 0: dummy0: hello!

## 0.5: dummy1: hello!

## 1: dummy2: hello!

## 1.5: dummy3: hello!

## simmer environment: anonymous | now: 2 | next: 2

## { Monitor: in memory }

## { Source: dummy | monitored: 1 | n\_generated: 21 }

Now, let’s say that we want to attach some empirical data, and our observations not only include arrival times, but also priorities and some attributes (e.g., measured service times), as in [this question](https://stackoverflow.com/questions/44865924/using-simmer-to-build-a-specific-model) on StackOverflow:

myData <- data.frame(

time = c(1:10,1:5),

priority = 1:3,

duration = rnorm(15, 50, 5)) %>%

dplyr::arrange(time)

This is indeed possible using generators, but it requires some trickery; more specifically, the clever usage of a *consumer* function as follows:

consume <- function(x, prio=FALSE) {

i <- 0

function() {

i <<- i + 1

if (prio) c(x[[i]], x[[i]], FALSE)

else x[[i]]

}

}

activityTraj <- trajectory() %>%

seize("worker") %>%

timeout\_from\_attribute("duration") %>%

release("worker")

initialization <- trajectory() %>%

set\_prioritization(consume(myData$priority, TRUE)) %>%

set\_attribute("duration", consume(myData$duration)) %>%

join(activityTraj)

arrivals\_gen <- simmer() %>%

add\_resource("worker", 2, preemptive=TRUE) %>%

add\_generator("dummy\_", initialization, at(myData$time)) %>%

run() %>%

get\_mon\_arrivals()

# check the resulting duration times

activity\_time <- arrivals\_gen %>%

tidyr::separate(name, c("prefix", "n"), convert=TRUE) %>%

dplyr::arrange(n) %>%

dplyr::pull(activity\_time)

all(activity\_time == myData$duration)

## [1] TRUE

Since this v3.8.0, the new data source add\_dataframe greatly simplifies this process:

arrivals\_df <- simmer() %>%

add\_resource("worker", 2, preemptive=TRUE) %>%

add\_dataframe("dummy\_", activityTraj, myData, time="absolute") %>%

run() %>%

get\_mon\_arrivals()

identical(arrivals\_gen, arrivals\_df)

## [1] TRUE

**On-disk monitoring**

As some users noted (see [1](https://groups.google.com/d/msg/simmer-devel/A4M7uP0Lmgw/f_0wkctKBQAJ), [2](https://groups.google.com/d/msg/simmer-devel/sO1OlQTpoXw/VL4-_iTBAQAJ)), the default in-memory monitoring capabilities can turn problematic for very long simulations. To address this issue, the simmer() constructor gains a new argument, mon, to provide different types of monitors. Monitoring is still performed in-memory by default, but as of v3.8.0, it can be offloaded to disk through monitor\_delim() and monitor\_csv(), which produce flat delimited files.

mon <- monitor\_csv()

mon

## simmer monitor: to disk (delimited files)

## { arrivals: /tmp/RtmpAlQH2g/file6933ce99281\_arrivals.csv }

## { releases: /tmp/RtmpAlQH2g/file6933ce99281\_releases.csv }

## { attributes: /tmp/RtmpAlQH2g/file6933ce99281\_attributes.csv }

## { resources: /tmp/RtmpAlQH2g/file6933ce99281\_resources.csv }

env <- simmer(mon=mon) %>%

add\_generator("dummy", hello\_sayer, function() rexp(1, 1)) %>%

run(until=2)

## 0.26309: dummy0: hello!

## 0.982183: dummy1: hello!

env

## simmer environment: anonymous | now: 2 | next: 2.29067480322535

## { Monitor: to disk (delimited files) }

## { arrivals: /tmp/RtmpAlQH2g/file6933ce99281\_arrivals.csv }

## { releases: /tmp/RtmpAlQH2g/file6933ce99281\_releases.csv }

## { attributes: /tmp/RtmpAlQH2g/file6933ce99281\_attributes.csv }

## { resources: /tmp/RtmpAlQH2g/file6933ce99281\_resources.csv }

## { Source: dummy | monitored: 1 | n\_generated: 3 }

read.csv(mon$handlers["arrivals"]) # direct access

## name start\_time end\_time activity\_time finished

## 1 dummy0 0.2630904 0.2630904 0 1

## 2 dummy1 0.9821828 0.9821828 0 1

get\_mon\_arrivals(env) # adds the "replication" column

## name start\_time end\_time activity\_time finished replication

## 1 dummy0 0.2630904 0.2630904 0 1 1

## 2 dummy1 0.9821828 0.9821828 0 1 1

See below for a comprehensive list of changes.

**New features:**

* New data source add\_dataframe enables the attachment of precomputed data, in the form of a data frame, to a trajectory. It can be used instead of (or along with) add\_generator. The most notable advantage over the latter is that add\_dataframe is able to automatically set attributes and prioritisation values per arrival based on columns of the provided data frame (#140 closing #123).
* New set\_source activity deprecates set\_distribution(). It works both for generators and data sources (275a09c, as part of #140).
* New monitoring interface allows for disk offloading. The simmer() constructor gains a new argument mon to provide different types of monitors. By default, monitoring is performed in-memory, as usual. Additionally, monitoring can be offloaded to disk through monitor\_delim and monitor\_csv, which produce flat delimited files. But more importantly, the C++ interface has been refactorised to enable the development of new monitoring backends (#146 closing #119).

**Minor changes and fixes:**

* Some documentation improvements (1e14ed7, 194ed05).
* New default until=Inf for the run method (3e6aae9, as part of #140).
* branch and clone now accept lists of trajectories, in the same way as join, so that there is no need to use do.call (#142).
* The argument continue (present in seize and branch) is recycled if only one value is provided but several sub-trajectories are defined (#143).
* Fix process reset: sources are reset in strict order of creation (e7d909b).
* Fix infinite timeouts (#144).