

## Program "R" Brief Introduction (Mar 2015)

1) ติดตั้ง **Queueing Packages** จาก Comprehensive R Archive Network (CRAN)

ต้องการ Internet access เพื่อ download ให้อัตโนมัติ

```
-----  
> install.packages("queueing")  
Installing package into '/home/anant/R/x86_64-pc-linux-gnu-library/3.0'  
(as 'lib' is unspecified)  
trying URL 'http://cran.rstudio.com/src/contrib/queueing_0.2.3.tar.gz'  
Content type 'application/x-gzip' length 203561 bytes (198 Kb)  
opened URL
```

```
=====  
downloaded 198 Kb
```

```
* installing *source* package 'queueing' ...  
** package 'queueing' successfully unpacked and MD5 sums checked  
** R  
** inst  
** preparing package for lazy loading  
** help  
*** installing help indices  
** building package indices  
** installing vignettes  
** testing if installed package can be loaded  
* DONE (queueing)
```

```
The downloaded source packages are in  
  '/tmp/Rtmpy3CftG/downloaded_packages'
```

2) **Load Packages** เข้าสู่ memory เพื่อใช้งาน

```
-----  
> library(queueing)
```

3) **เริ่มใช้งาน**

ตัวอย่าง M/M/1

```
-----  
> x = NewInput.MM1(lambda = 0.3, mu = 0.5, n = 20)  
> y = QueueingModel(x)  
> summary(y)
```

```
The inputs of the M/M/1 model are:  
lambda: 0.3, mu: 0.5, n: 20
```

```
The outputs of the M/M/1 model are:
```

```
The probability (p0, p1, ..., pn) of the n = 20 clients in the system  
are:  
0.4 0.24 0.144 0.0864 0.05184 0.031104 0.0186624 0.01119744 0.006718464  
0.004031078 0.002418647 0.001451188 0.0008707129 0.0005224278  
0.0003134567 0.000188074 0.0001128444 6.770664e-05 4.062398e-05  
2.437439e-05 1.462463e-05  
The traffic intensity is: 0.6
```

```
The server use is: 0.6
The mean number of clients in the system is: 1.5
The mean number of clients in the queue is: 0.9
The mean number of clients in the server is: 0.6
The mean time spend in the system is: 5
The mean time spend in the queue is: 3
The mean time spend in the server is: 2
The mean time spend in the queue when there is queue is: 5
The throughput is: 0.3
>
```

#### 4) สร้างกราฟ

```
-----
> plot(0:20,y$Pn,xlab = "#Customers", ylab = "PDF")
> plot(0:20,y$Pn,xlab = "#Customers", ylab = "PDF", type = "l")
> plot(0:20,y$Pn,xlab = "#Customers", ylab = "PDF", type = "p")
> plot(0:20,y$Pn,xlab = "#Customers", ylab = "PDF", type = "p", main =
"MM1 Queue")
```

#### 5) กำหนดเปรียบเทียบ

```
-----
> y$RO
[1] 0.6

> y$Inputs$lambda
[1] 0.3

> y$Inputs$mu
[1] 0.5

> y$Pn
[1] 4.000000e-01 2.400000e-01 1.440000e-01 8.640000e-02 5.184000e-02
3.110400e-02 1.866240e-02
[8] 1.119744e-02 6.718464e-03 4.031078e-03 2.418647e-03 1.451188e-03
8.707129e-04 5.224278e-04
[15] 3.134567e-04 1.880740e-04 1.128444e-04 6.770664e-05 4.062398e-05
2.437439e-05 1.462463e-05

> y$Pn[1]
[1] 0.4
```