HW 6

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https://github.com/mokys1213/STATS-506-FA-2024/blob/main/HW6/hw6.pdf

```
library(DBI)
library(parallel)
library(future)
library(data.table)
```

```
# Import the SQLite database of the Lahman data
lahman <- dbConnect(RSQLite::SQLite(), "lahman_1871-2022.sqlite")

# Reading in fielding data
Fielding=dbGetQuery(lahman, "SELECT * FROM Fielding")
# Calculating Range Factor
Fielding$RF=3*(Fielding$PO+Fielding$A)/Fielding$InnOuts
# Data cleaning
fielding=na.omit(Fielding[, c("teamID", "RF")])
fielding=fielding[!is.infinite(fielding$RF),]

# Calculating the average RF for each team
point_est=aggregate(fielding$RF,by=list(fielding$teamID), FUN =mean)
colnames(point_est)=c("teamID", "meanRF")
```

A

```
fielding_dat=data.table(fielding)

# Bootstrap using data.table
f = function(data) {
  tmp=data[,.SD[sample(.N, replace=TRUE)], by=teamID]
  return(tmp[,.(meanRF = mean(RF)), by=teamID])
}

# Checking the function
f(fielding_dat)
```

```
##      teamID    meanRF
##      <char>     <num>
##   1:    SFN 0.3935171
##   2:    CHN 0.4176912
##   3:    CHA 0.4095987
```

```
##   4:    BOS 0.4042868
##   5:    SEA 0.3938972
##  ---
## 136:    NYP 0.4116954
## 137:    PHP 0.4260829
## 138:    IN1 0.3881667
## 139:    RIC 0.5833787
## 140:    BL4 0.4195785
```

```
# Measuring time
system.time(f(fielding_dat))
```

```
##    user  system elapsed
##   0.012   0.001   0.013
```

A1: Without any parallel processing

```
reps=1000

# Using lapply
system.time({
  result1=lapply(seq_len(reps), function(x) f(fielding_dat))
})
```

```
##    user  system elapsed
##  11.597   0.523  12.291
```

A2: Using parallel processing with the parallel package

```
# Using mcapply
system.time({
  result2=mclapply(seq_len(reps), function(x) f(fielding_dat), mc.cores=5)
})
```

```
##    user  system elapsed
##   0.008   0.040   2.681
```

A3: Using futures with the future package

```
# Using future
plan(multisession)
system.time({
  result3=lapply(seq_len(reps), function(x) {
    future(f(fielding_dat),seed=TRUE)
  })
  result3 =lapply(result3,value)
})
```

```
##    user  system elapsed
##  56.943   1.785  73.628
```

B

```
# Generating a table showing the estimated RF and associated SE from the three approaches.
tablesum <- function(results) {
  bind=rbindlist(results)
  summary=bind[, .(meanRF=mean(meanRF), SE=sd(meanRF)), by=teamID]
  return(summary)
}

# Showing the results
print(tablesum(result1), n = 1e3)
```

```
##      teamID    meanRF          SE
##      <char>     <num>       <num>
##   1:    SFN 0.4015856 0.005548623
##   2:    CHN 0.4152027 0.004840454
##   3:    CHA 0.4062771 0.005333819
##   4:    BOS 0.4018672 0.005450617
##   5:    SEA 0.3862459 0.006413892
##   6:    NYA 0.4039726 0.005312711
##   7:    NYN 0.4023262 0.005483719
##   8:    ATL 0.3883860 0.005922788
##   9:    ML1 0.4411198 0.014990340
##  10:    ML4 0.4140520 0.008773802
##  11:    CAL 0.4163273 0.008530045
##  12:    BAL 0.3924154 0.005413244
##  13:    LAN 0.3947458 0.005632953
##  14:    OAK 0.4029759 0.006744534
##  15:    HOU 0.4011189 0.005986353
##  16:    WAS 0.3742871 0.008146508
##  17:    MIN 0.3917549 0.006009025
##  18:    PH3 0.4685152 0.087948995
##  19:    BR2 0.4003723 0.025805475
##  20:    PHI 0.4008488 0.004861431
##  21:    BSN 0.4552796 0.008723556
##  22:    PIT 0.4108443 0.004813931
##  23:    BRO 0.4424222 0.010274781
##  24:    TL2 0.4195331 0.061248408
##  25:    CLE 0.4006950 0.005150992
##  26:    DET 0.4068974 0.005486882
##  27:    FLO 0.3704923 0.010094110
##  28:    MIL 0.3590150 0.008352183
##  29:    COL 0.3895652 0.008198934
##  30:    SLN 0.4196549 0.004938733
##  31:    KCA 0.3908591 0.006094969
##  32:    TBA 0.3562090 0.007859806
##  33:    KC1 0.4066433 0.012945316
##  34:    TRO 0.4717319 0.042538102
```

```
##  35:    WS1 0.4641617 0.012818765
##  36:    CIN 0.4033354 0.004881936
##  37:    SLA 0.4656242 0.017047489
##  38:    SDN 0.3939570 0.005994215
##  39:    TEX 0.3854763 0.006127194
##  40:    LAA 0.3757023 0.009442694
##  41:    ARI 0.3663700 0.008360694
##  42:    TOR 0.3753444 0.006648025
##  43:    SR1 0.4651007 0.040514926
##  44:    SL4 0.4365461 0.016387032
##  45:    RC1 0.5735413 0.082624004
##  46:    PH2 0.4649533 0.033990321
##  47:    BS1 0.4528255 0.032241768
##  48:    HR1 0.3825420 0.038645452
##  49:    CN1 0.4400871 0.023781161
##  50:    MIA 0.3633644 0.011995360
##  51:    TRN 0.4806534 0.029661224
##  52:    BL2 0.4012179 0.015742796
##  53:    SE1 0.4181083 0.045361764
##  54:    PT1 0.4436742 0.023068564
##  55:    WSU 0.4016392 0.035555350
##  56:    CL3 0.4589168 0.029715639
##  57:    ML3 0.4643193 0.064412238
##  58:    MON 0.4181237 0.008306277
##  59:    KCU 0.4176300 0.030045098
##  60:    ANA 0.4155183 0.015349001
##  61:    WS2 0.3992829 0.012290963
##  62:    MID 0.4572700 0.061598959
##  63:    CL2 0.4358365 0.022202672
##  64:    NY1 0.4401587 0.009192382
##  65:    KC2 0.3815427 0.025660667
##  66:    CL4 0.4437824 0.016544081
##  67:    BR1 0.4358647 0.041004996
##  68:    CL1 0.3836684 0.039690060
##  69:    ELI 0.5259058 0.063860564
##  70:    WS6 0.4139049 0.056224486
##  71:    LS1 0.5307575 0.056369492
##  72:    WS3 0.4111216 0.046078156
##  73:    NY2 0.3890849 0.022881526
##  74:    HAR 0.4220154 0.045992540
##  75:    PRO 0.4658675 0.022646723
##  76:    LS3 0.4895347 0.015424618
##  77:    SL5 0.3764828 0.030431896
##  78:    WS9 0.4390964 0.036480422
##  79:    BLN 0.4497400 0.018971297
##  80:    MLA 0.4199814 0.037257102
##  81:    IN3 0.4194124 0.030388336
##  82:    BRP 0.4333528 0.055014201
##  83:    CN3 0.4350688 0.049875765
##  84:    LS2 0.4737589 0.016539072
##  85:    PH1 0.4535927 0.027016928
##  86:    PHA 0.4657977 0.018041976
##  87:    FW1 0.4433062 0.051831750
##  88:    BLA 0.4953166 0.032144523
```

```
##  89:    PH4 0.4127230 0.015564623
##  90:    TL1 0.4571707 0.047584297
##  91:    WS8 0.4463205 0.021726605
##  92:    CHU 0.3428147 0.037015189
##  93:    BLU 0.3828468 0.041752543
##  94:    WS5 0.4103414 0.051439715
##  95:    IN2 0.4648709 0.045539411
##  96:    PHU 0.4807114 0.046933258
##  97:    WIL 0.3802887 0.059775518
##  98:    CLP 0.4056035 0.042826402
##  99:    BL3 0.4441119 0.039147787
## 100:    SLU 0.3923151 0.039074887
## 101:    KCN 0.4415656 0.048107401
## 102:    CN2 0.4386645 0.020628854
## 103:    MLU 0.5073960 0.129686663
## 104:    DTN 0.4218506 0.017442103
## 105:    BFP 0.4641852 0.051966220
## 106:    CL6 0.4098781 0.028563606
## 107:    CHP 0.4747089 0.052760891
## 108:    NH1 0.4410844 0.051488788
## 109:    CNU 0.4474828 0.050742757
## 110:    SPU 0.4610643 0.085990610
## 111:    KEO 0.5174475 0.112212223
## 112:    WS7 0.4507936 0.049633423
## 113:    RC2 0.4727813 0.044291827
## 114:    BL1 0.4399462 0.028813231
## 115:    SL2 0.3919014 0.058166453
## 116:    SL3 0.3987293 0.039511631
## 117:    SR2 0.4116983 0.040263192
## 118:    CL5 0.4410159 0.044714822
## 119:    NY4 0.4416192 0.024834697
## 120:    NY3 0.3809282 0.040519770
## 121:    PTP 0.4469741 0.052152338
## 122:    BR3 0.4470881 0.022739839
## 123:    ML2 0.4379202 0.052418984
## 124:    WOR 0.4249979 0.034565020
## 125:    PHN 0.4509289 0.042758157
## 126:    ALT 0.3888404 0.052384957
## 127:    WS4 0.4627325 0.057248510
## 128:    CH2 0.4377042 0.034642850
## 129:    SL1 0.3360628 0.063221335
## 130:    BSU 0.4182306 0.057617986
## 131:    BR4 0.4409474 0.047697351
## 132:    CH1 0.4303330 0.061009497
## 133:    BFN 0.4518598 0.021036686
## 134:    BSP 0.4316373 0.046686950
## 135:    BS2 0.4338238 0.048604672
## 136:    NYP 0.4253920 0.046571359
## 137:    PHP 0.4413326 0.057354723
## 138:    IN1 0.4102675 0.066602627
## 139:    RIC 0.5084548 0.062392455
## 140:    BL4 0.4324159 0.057403901
##      teamID    meanRF          SE
```

```
print(tablesum(result2), n = 1e3)
```

```
##       teamID    meanRF          SE
##       <char>     <num>       <num>
##    1:    SFN 0.4014654 0.005443352
##    2:    CHN 0.4151156 0.004875964
##    3:    CHA 0.4061641 0.005571379
##    4:    BOS 0.4019716 0.005604711
##    5:    SEA 0.3865818 0.006613502
##    6:    NYA 0.4037381 0.005319315
##    7:    NYN 0.4022923 0.005507249
##    8:    ATL 0.3883248 0.006123525
##    9:    ML1 0.4401429 0.014842617
##   10:    ML4 0.4144956 0.008735224
##   11:    CAL 0.4163691 0.008612240
##   12:    BAL 0.3926185 0.005554469
##   13:    LAN 0.3952064 0.005660156
##   14:    OAK 0.4032095 0.007075038
##   15:    HOU 0.4015026 0.006159849
##   16:    WAS 0.3743384 0.007959814
##   17:    MIN 0.3916289 0.005678865
##   18:    PH3 0.4689911 0.089054648
##   19:    BR2 0.3990262 0.025196203
##   20:    PHI 0.4007613 0.004483625
##   21:    BSN 0.4558867 0.009253671
##   22:    PIT 0.4108975 0.004895764
##   23:    BRO 0.4426302 0.009888797
##   24:    TL2 0.4192080 0.061056446
##   25:    CLE 0.4007240 0.005184637
##   26:    DET 0.4066766 0.005452332
##   27:    FLO 0.3705256 0.010153952
##   28:    MIL 0.3595080 0.008343490
##   29:    COL 0.3891338 0.007674044
##   30:    SLN 0.4200579 0.005182955
##   31:    KCA 0.3911530 0.006102213
##   32:    TBA 0.3566819 0.007973467
##   33:    KC1 0.4079047 0.012365538
##   34:    TRO 0.4722205 0.042115411
##   35:    WS1 0.4635334 0.012272567
##   36:    CIN 0.4033035 0.004979030
##   37:    SLA 0.4662554 0.017754267
##   38:    SDN 0.3940204 0.005983366
##   39:    TEX 0.3850001 0.006261527
##   40:    LAA 0.3762473 0.009364963
##   41:    ARI 0.3661683 0.008648266
##   42:    TOR 0.3751432 0.006280236
##   43:    SR1 0.4646271 0.038549752
##   44:    SL4 0.4364402 0.016758221
##   45:    RC1 0.5755878 0.083462763
##   46:    PH2 0.4644014 0.033438000
##   47:    BS1 0.4522637 0.032480972
##   48:    HR1 0.3824582 0.038577900
##   49:    CN1 0.4409243 0.023727181
```

```
##  50:    MIA 0.3641633 0.012389181
##  51:    TRN 0.4812443 0.030071181
##  52:    BL2 0.4010386 0.015952175
##  53:    SE1 0.4170236 0.042921637
##  54:    PT1 0.4426714 0.022964696
##  55:    WSU 0.3989184 0.034402519
##  56:    CL3 0.4595419 0.029388992
##  57:    ML3 0.4627936 0.061707823
##  58:    MON 0.4168636 0.008617441
##  59:    KCU 0.4174459 0.032120394
##  60:    ANA 0.4147788 0.015179625
##  61:    WS2 0.3987252 0.012970048
##  62:    MID 0.4633911 0.062196106
##  63:    CL2 0.4354306 0.023363323
##  64:    NY1 0.4401348 0.009144253
##  65:    KC2 0.3811373 0.026217348
##  66:    CL4 0.4449726 0.016457299
##  67:    BR1 0.4381126 0.043767605
##  68:    CL1 0.3825971 0.039164888
##  69:    ELI 0.5261571 0.062368489
##  70:    WS6 0.4193702 0.056039170
##  71:    LS1 0.5281010 0.058301366
##  72:    WS3 0.4087467 0.046491526
##  73:    NY2 0.3887807 0.022697157
##  74:    HAR 0.4162494 0.046368955
##  75:    PRO 0.4660797 0.021988128
##  76:    LS3 0.4893312 0.015699802
##  77:    SL5 0.3757008 0.029418376
##  78:    WS9 0.4377929 0.036202944
##  79:    BLN 0.4496816 0.018332557
##  80:    MLA 0.4187304 0.039134932
##  81:    IN3 0.4205419 0.030404763
##  82:    BRP 0.4360232 0.055093171
##  83:    CN3 0.4377519 0.049909226
##  84:    LS2 0.4734669 0.015614219
##  85:    PH1 0.4543023 0.027137332
##  86:    PHA 0.4655620 0.017668018
##  87:    FW1 0.4387507 0.050075165
##  88:    BLA 0.4964733 0.031412333
##  89:    PH4 0.4129613 0.015713004
##  90:    TL1 0.4547512 0.046511769
##  91:    WS8 0.4472436 0.020774946
##  92:    CHU 0.3425424 0.037505675
##  93:    BLU 0.3873445 0.042983458
##  94:    WS5 0.4046470 0.049634286
##  95:    IN2 0.4642031 0.046898956
##  96:    PHU 0.4827670 0.046514024
##  97:    WIL 0.3821357 0.058193110
##  98:    CLP 0.4052256 0.045836243
##  99:    BL3 0.4463687 0.040843488
## 100:    SLU 0.3935738 0.039856210
## 101:    KCN 0.4422416 0.047544105
## 102:    CN2 0.4390991 0.020897039
## 103:    MLU 0.5147740 0.128924068
```

```
## 104:    DTN 0.4225362 0.017054329
## 105:    BFP 0.4619448 0.053001935
## 106:    CL6 0.4107172 0.027156349
## 107:    CHP 0.4757945 0.049684404
## 108:    NH1 0.4392346 0.047132225
## 109:    CNU 0.4470959 0.052858066
## 110:    SPU 0.4626847 0.082729773
## 111:    KEO 0.5054762 0.111800998
## 112:    WS7 0.4482926 0.047693413
## 113:    RC2 0.4731018 0.043884938
## 114:    BL1 0.4428298 0.030402385
## 115:    SL2 0.3957445 0.059777618
## 116:    SL3 0.3963887 0.039404156
## 117:    SR2 0.4137706 0.040552425
## 118:    CL5 0.4425696 0.045736958
## 119:    NY4 0.4413813 0.025668759
## 120:    NY3 0.3818018 0.041561453
## 121:    PTP 0.4485407 0.052673313
## 122:    BR3 0.4487129 0.022875081
## 123:    ML2 0.4402394 0.056347354
## 124:    WOR 0.4238398 0.034861673
## 125:    PHN 0.4503025 0.039609685
## 126:    ALT 0.3868348 0.048512136
## 127:    WS4 0.4676806 0.058847291
## 128:    CH2 0.4399678 0.035906559
## 129:    SL1 0.3384520 0.065556036
## 130:    BSU 0.4206429 0.058981727
## 131:    BR4 0.4399792 0.046990115
## 132:    CH1 0.4277067 0.060972945
## 133:    BFN 0.4511865 0.020295827
## 134:    BSP 0.4308282 0.049596613
## 135:    BS2 0.4294871 0.047170174
## 136:    NYP 0.4232235 0.048630060
## 137:    PHP 0.4441681 0.057445982
## 138:    IN1 0.4080384 0.065359147
## 139:    RIC 0.5100174 0.070025076
## 140:    BL4 0.4279211 0.057139006
##      teamID    meanRF          SE
```

```
print(tablesum(result3), n = 1e3)
```

```
##      teamID    meanRF          SE
##      <char>     <num>       <num>
##   1:    SFN 0.4020027 0.005499027
##   2:    CHN 0.4150729 0.004774425
##   3:    CHA 0.4058265 0.005543303
##   4:    BOS 0.4018623 0.005281289
##   5:    SEA 0.3864168 0.006337147
##   6:    NYA 0.4038713 0.005550762
##   7:    NYN 0.4023526 0.005558205
##   8:    ATL 0.3882148 0.005919950
##   9:    ML1 0.4421785 0.015336414
##  10:    ML4 0.4140864 0.009191521
##  11:    CAL 0.4157758 0.007945086
```

```
##  12:    BAL 0.3923183 0.005454746
##  13:    LAN 0.3949039 0.005646110
##  14:    OAK 0.4031497 0.006768886
##  15:    HOU 0.4013114 0.006028147
##  16:    WAS 0.3743151 0.007978804
##  17:    MIN 0.3916913 0.005743764
##  18:    PH3 0.4660780 0.086461158
##  19:    BR2 0.4010329 0.026233865
##  20:    PHI 0.4009381 0.004862864
##  21:    BSN 0.4556994 0.008787236
##  22:    PIT 0.4113301 0.004854216
##  23:    BRO 0.4423843 0.010231063
##  24:    TL2 0.4181026 0.061767121
##  25:    CLE 0.4005702 0.005410103
##  26:    DET 0.4068211 0.005408750
##  27:    FLO 0.3705360 0.009823277
##  28:    MIL 0.3589800 0.008283465
##  29:    COL 0.3896212 0.007712818
##  30:    SLN 0.4197300 0.005229595
##  31:    KCA 0.3904650 0.006312580
##  32:    TBA 0.3567485 0.008203569
##  33:    KC1 0.4080144 0.012942366
##  34:    TRO 0.4713135 0.042262172
##  35:    WS1 0.4635700 0.012439979
##  36:    CIN 0.4032252 0.004842085
##  37:    SLA 0.4667640 0.017027565
##  38:    SDN 0.3939787 0.005806459
##  39:    TEX 0.3852003 0.005982521
##  40:    LAA 0.3755464 0.009157181
##  41:    ARI 0.3661391 0.008401004
##  42:    TOR 0.3749111 0.006527189
##  43:    SR1 0.4658480 0.038912665
##  44:    SL4 0.4357454 0.017047647
##  45:    RC1 0.5764453 0.079367580
##  46:    PH2 0.4635437 0.032357437
##  47:    BS1 0.4513139 0.033075996
##  48:    HR1 0.3839234 0.038511906
##  49:    CN1 0.4420533 0.023897161
##  50:    MIA 0.3638169 0.012396546
##  51:    TRN 0.4812331 0.029756431
##  52:    BL2 0.4012957 0.015998075
##  53:    SE1 0.4166973 0.043352936
##  54:    PT1 0.4429240 0.023621942
##  55:    WSU 0.3995913 0.034750931
##  56:    CL3 0.4585162 0.029565323
##  57:    ML3 0.4639499 0.061097882
##  58:    MON 0.4169643 0.008660215
##  59:    KCU 0.4165945 0.030833172
##  60:    ANA 0.4151118 0.015692492
##  61:    WS2 0.3988202 0.013096947
##  62:    MID 0.4561584 0.062623574
##  63:    CL2 0.4366970 0.022723743
##  64:    NY1 0.4395884 0.008718195
##  65:    KC2 0.3806696 0.025268556
```

```
##  66:    CL4 0.4454312 0.016900875
##  67:    BR1 0.4372849 0.043969044
##  68:    CL1 0.3844542 0.039587726
##  69:    ELI 0.5275753 0.062036759
##  70:    WS6 0.4151643 0.058175022
##  71:    LS1 0.5297775 0.055746450
##  72:    WS3 0.4080525 0.045591350
##  73:    NY2 0.3897475 0.023582947
##  74:    HAR 0.4158674 0.046440372
##  75:    PRO 0.4651514 0.022153411
##  76:    LS3 0.4889190 0.015595433
##  77:    SL5 0.3741587 0.029793941
##  78:    WS9 0.4385071 0.036768880
##  79:    BLN 0.4491186 0.019057801
##  80:    MLA 0.4203107 0.037054016
##  81:    IN3 0.4188397 0.031970979
##  82:    BRP 0.4345763 0.054928428
##  83:    CN3 0.4360100 0.051831352
##  84:    LS2 0.4734168 0.016256287
##  85:    PH1 0.4544291 0.027726291
##  86:    PHA 0.4654056 0.017789607
##  87:    FW1 0.4402167 0.050184855
##  88:    BLA 0.4938332 0.030837295
##  89:    PH4 0.4121453 0.014879365
##  90:    TL1 0.4552594 0.048596536
##  91:    WS8 0.4479207 0.021820671
##  92:    CHU 0.3419787 0.035314841
##  93:    BLU 0.3842919 0.041279192
##  94:    WS5 0.4082562 0.051562812
##  95:    IN2 0.4638614 0.046144067
##  96:    PHU 0.4780305 0.045249486
##  97:    WIL 0.3820870 0.061608628
##  98:    CLP 0.4040893 0.044919796
##  99:    BL3 0.4440157 0.040153194
## 100:    SLU 0.3925639 0.039548351
## 101:    KCN 0.4423467 0.050913978
## 102:    CN2 0.4382885 0.020172763
## 103:    MLU 0.5150337 0.128047011
## 104:    DTN 0.4221191 0.016575940
## 105:    BFP 0.4632638 0.053904048
## 106:    CL6 0.4114028 0.028658871
## 107:    CHP 0.4756650 0.050071333
## 108:    NH1 0.4407976 0.047348308
## 109:    CNU 0.4449681 0.049144091
## 110:    SPU 0.4630574 0.088382229
## 111:    KEO 0.5117600 0.117424227
## 112:    WS7 0.4525335 0.047367236
## 113:    RC2 0.4759832 0.046205525
## 114:    BL1 0.4423453 0.029520413
## 115:    SL2 0.3923168 0.057969989
## 116:    SL3 0.3965585 0.038824402
## 117:    SR2 0.4123703 0.040099103
## 118:    CL5 0.4411244 0.043511654
## 119:    NY4 0.4420907 0.024957413
```

```
## 120:    NY3 0.3818029 0.041146568
## 121:    PTP 0.4485610 0.052509020
## 122:    BR3 0.4482644 0.022290666
## 123:    ML2 0.4406556 0.056567941
## 124:    WOR 0.4236178 0.033893648
## 125:    PHN 0.4524009 0.041580204
## 126:    ALT 0.3874818 0.049803691
## 127:    WS4 0.4642801 0.059124515
## 128:    CH2 0.4376474 0.036265108
## 129:    SL1 0.3388403 0.062056697
## 130:    BSU 0.4189833 0.057032787
## 131:    BR4 0.4405334 0.048290913
## 132:    CH1 0.4287401 0.059669971
## 133:    BFN 0.4514544 0.020450530
## 134:    BSP 0.4323097 0.048596153
## 135:    BS2 0.4302785 0.046405446
## 136:    NYP 0.4243027 0.047925187
## 137:    PHP 0.4419361 0.057272274
## 138:    IN1 0.4068618 0.063429217
## 139:    RIC 0.5083798 0.068834129
## 140:    BL4 0.4304018 0.058906899
##      teamID    meanRF          SE
```

C

Without Parallel Processing (lapply) it took 11.7 seconds for 1000 simulations
Using parallel (mclapply) it took 2.6 seconds for 1000 simulations
Using future Package, it took 72.8 seconds for 1000 simulations

Using parallel (mclapply) is the best choice for this problem. It is the fastest.

But all three methods resulted similar mean estimates and standard errors