25 Stress Test

(I) Response time :

$x_{response\_time\_run\_1} = 3230.23_s \qquad n = 2$

$x_{response\_time\_run\_2} = 3311.68_s$

$$\bar{x} = \frac{x_{response\_time\_run\_1} + x_{response\_time\_run2}}{2}$$

$$= \frac{3230.23 + 3311.68}{2} = 3270.955_s$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_{1}^{n}(x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{2-1}(3817.051)}$$

$$S = 57.594$$

★ Since $n = 2 < 30$, we will use student t-distribution.

Assume, $\alpha = 0.05$

$t_{1-\alpha/2;\, n-1} = t_{0.975;\, 1} = 4.3027$

$S/\sqrt{n} = 57.594/\sqrt{2} = 40.725$

$$CI = \left(\bar{x} \pm S/\sqrt{n}\,(t_{1-\alpha/2;\, n-1})\right) = (3311.68 \pm 40.725(4.3027))$$

$$= (3136.4525,\ 3486.9075)$$

∴ The 95% confidence interval is : $3136.4525_s \leq \mu \leq 3486.9075_s$ for response time in Stress Test 25.

(II) CPU Usage :

$x_{CPU\text{-}usage\text{-}run\text{-}1} = 12.2156$ (in %) $\quad n = 2$

$x_{CPU\text{-}usage\text{-}run\text{-}2} = 18.7799$ (in %)

$$\bar{x} = \frac{x_{CPU\text{-}usage\text{-}run\text{-}1} + x_{CPU\text{-}usage\text{-}run\text{-}2}}{2}$$

$$= \frac{12.2156 + 18.7799}{2} = 15.49775$$

$$s = \sqrt{\frac{1}{n-1}\left(\sum_i (x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{(2-1)}(21.5450)} = 4.642$$

$$s/\sqrt{n} = 4.642/\sqrt{2} = 3.2822$$

✱ Since $n = 2 < 30$, we will use student t distribution

Assume, $\alpha = 0.05$

$$t_{1-\alpha/2;\,n-1} = t_{0.975;\,1} = 4.3027$$

$$\therefore CI = \left(\bar{x} \pm t_{1-\alpha/2;\,n-1}\,(s/\sqrt{n})\right) = \left(15.4976 \pm 4.3027(3.2822)\right)$$

$$= \left(1.3705\ ,\ 29.6178\right)$$

∴ The 95% confidence interval is :

$1.3705\% \leq \mu \leq 29.6178\%$

for CPU Utilization (%) in Stress test 2S.

(III) Memory Utilization :

$x\text{-mem-usage-run-1} = 5.0799$ (in %) ; $n = 2$

$x\text{-mem-usage-run-2} = 5.01711$ (in %)

$$\bar{x} = \frac{5.0799 + 5.01711}{2} = 5.048505$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_{i=1}^{n}(x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{2-1}\left(1.971 \times 10^{-3}\right)} = 0.04440$$

$$S/\sqrt{n} = 0.0444/\sqrt{2} = 0.0314$$

✱ Since $n = 2 < 30$, we will use student t distribution

Assume, $\alpha = 0.05$

$$t_{1-\alpha/2;\,n-1} = t_{0.975} = 4.3027$$

$$\therefore CI = \left(\bar{x} \pm t_{1-\alpha/2;\,n-1}\left(S/\sqrt{n}\right)\right) = \left(5.04851 \pm 4.3027(0.0314)\right)$$

$$= (4.9134 \;,\; 5.1836)$$

∴ The 95% confidence interval is :

$4.9134\ \% \leq \mu \leq 5.1836\ \%$

for Mem Utilization (%) in Stress test 25.

50 Stress Test

(I) Response time :

$x_{response\_time\_run\_1} = 3271.53\ s$ $\quad n = 2$

$x_{response\_time\_run\_2} = 2913.89\ s$

$$\bar{x} = \frac{x_{response\_time\_run\_1} + x_{response\_time\_run2}}{2}$$

$$= \frac{3271.53 + 2913.89}{2} = 3092.71\ s$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_{1}^{n}(x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{2-1}(63953.18)}$$

$$S = 252.8897$$

★ Since $n = 2 < 30$, we will use student t-distribution.

Assume, $\alpha = 0.05$

$t_{1-\alpha/2;\,n-1} = t_{0.975;\,1} = 4.3027$

$S/\sqrt{n} = 252.8897/\sqrt{2} = 178.82$

$$CI = \left(\bar{x} \pm S/\sqrt{n}\,(t_{1-\alpha/2;\,n-1})\right) = \left(3092.71 \pm 178.82\,(4.3027)\right)$$

$$= (2323.3012,\ 3862.1188)$$

∴ The 95% confidence interval is : $2323.3012\ s \leq \mu \leq 3862.1188\ s$ for response time in Stress Test 50.

(II) CPU Usage :

$x_{CPU\text{-}usage\text{-}run\text{-}1} = 16.2067$ (in %) $\quad n = 2$

$x_{CPU\text{-}usage\text{-}run\text{-}2} = 21.6776$ (in %)

$$\bar{x} = \frac{x_{CPU\text{-}usage\text{-}run\text{-}1} + x_{CPU\text{-}usage\text{-}run\text{-}2}}{2}$$

$$= \frac{16.2067 + 21.6776}{2} = 18.93685$$

$$s = \sqrt{\frac{1}{n-1}\left(\sum_i (x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{(2-1)}(14.9654)} = 3.8685$$

$$s/\sqrt{n} = 3.8685/\sqrt{2} = 2.73544$$

✱ Since $n = 2 < 30$, we will use student t distribution

Assume, $\alpha = 0.05$

$$t_{1-\alpha/2;\,n-1} = t_{0.975;\,1} = 4.3027$$

$$\therefore CI = \left(\bar{x} \pm t_{1-\alpha/2;\,n-1}\left(s/\sqrt{n}\right)\right) = \left(18.93685 \pm 4.3027\,(2.73544)\right)$$

$$= (7.1672,\ 30.7065)$$

∴ The 95% confidence interval is :

$7.1672\ \% \leq \mu \leq 30.2065\ \%$

for CPU Utilization (%) in Stress test 50.

(III) Memory Utilization:

$x\text{-mem-usage-run-1} = 6.0822$ (in %) ; $n = 2$

$x\text{-mem-usage-run-2} = 22.0398$ (in %)

$$\bar{x} = \frac{6.0822 + 22.0398}{2} = 14.061$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_{i=1}^{n}(x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{2-1}(127.3224)} = 11.2837$$

$$S/\sqrt{n} = 11.2837/\sqrt{2} = 7.9788$$

✱ Since $n = 2 < 30$, we will use student t distribution

Assume, $\alpha = 0.05$

$$t_{1-\alpha/2;n-1} = t_{0.975} = 4.3027$$

$$\therefore CI = \left(\bar{x} \pm t_{1-\alpha/2;n-1}\left(S/\sqrt{n}\right)\right) = \left(14.061 \pm 4.3027(7.9788)\right)$$

$$= (-20.2694,\ 48.3914)$$

∴ The 95% confidence interval is:

$-20.2694\% \leq \mu \leq 48.3914\%$

for Mem Utilization (%) in Stress test 50.

Soak Test

(I) Response time:

$x_{response\_time\_run\_1} = 2835.76$ $\quad n = 2$

$x_{response\_time\_run\_2} = 2839.43$

$$\bar{x} = \frac{x_{response\_time\_run\_1} + x_{response\_time\_run2}}{2}$$

$$= \frac{2835.76 + 2839.43}{2} = 2837.595$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_{1}^{n}(x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{2-1}(6.7345)}$$

$$S = 2.595508$$

★ Since $n = 2 < 30$, we will use student t-distribution.

Assume, $\alpha = 0.05$

$t_{1-\alpha/2;n-1} = t_{0.975;1} = 4.3027$

$S/\sqrt{n} = 2.595508/\sqrt{2} = 1.835$

$$CI = \left(\bar{x} \pm S/\sqrt{n}\,(t_{1-\alpha/2;n-1})\right) = (2837.595 \pm 1.835\,(4.3027))$$

$$= (2829.6995, 2845.490455)$$

∴ The 95% confidence interval is: $2829.6995 \leq \mu \leq 2845.4904$ for response time in Soak Test.

(II) CPU Usage :

$x_{CPU\text{-}usage\text{-}run\text{-}1} = 27.1342$ (in %) $\quad n = 2$

$x_{CPU\text{-}usage\text{-}run\text{-}2} = 31.5057$ (in %)

$$\bar{x} = \frac{x_{CPU\text{-}usage\text{-}run\text{-}1} + x_{CPU\text{-}usage\text{-}run\text{-}2}}{2}$$

$$= \frac{27.1342 + 31.5057}{2} = 29.31995$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_i (x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{(2-1)}(8.8005)} = 2.9665$$

$$S/\sqrt{n} = 2.9665/\sqrt{2} = 2.0977$$

✱ Since $n = 2 < 30$, we will use student t distribution

Assume, $\alpha = 0.05$

$$t_{1-\alpha/2;\,n-1} = t_{0.975;\,1} = 4.3027$$

$$\therefore CI = \left(\bar{x} \pm t_{1-\alpha/2;\,n-1}\left(S/\sqrt{n}\right)\right) = \left(29.31995 \pm 4.3027\,(2.0977)\right)$$

$$= (20.2942,\ 38.3456)$$

∴ The 95% confidence interval is :

$20.2942\ \% \le \mu \le 38.3456\ \%$

for CPU Utilization (%) in Soak test

(III) Memory Utilization :

$x\text{-}mem\text{-}usage\text{-}run\text{-}1 = 37.20025$ (in %) ; $n = 2$

$x\text{-}mem\text{-}usage\text{-}run\text{-}2 = 36.6541$ (in %)

$$\bar{x} = \frac{37.20025 + 36.6541}{2} = 36.92717$$

$$S = \sqrt{\frac{1}{n-1}\left(\sum_{i=1}^{n}(x_i - \bar{x})^2\right)} = \sqrt{\frac{1}{2-1}(0.14914)} = 0.3862$$

$$S/\sqrt{n} = 0.3862/\sqrt{2} = 0.2731$$

✱ Since $n = 2 < 30$, we will use student t distribution

Assume, $\alpha = 0.05$

$$t_{1-\alpha/2;\,n-1} = t_{0.975} = 4.3027$$

$$\therefore CI = \left(\bar{x} \pm t_{1-\alpha/2;\,n-1}\left(S/\sqrt{n}\right)\right) = \left(36.92717 \pm 4.3027\,(0.2731)\right)$$

$$= (35.7521,\ 38.10224)$$

∴ The 95% confidence interval is :

$35.7521\% \leq \mu \leq 38.10224\%$

for Mem Utilization (%) in Soak Test.