How is the error computed:

Relative residual:

$$\text{RR} = \frac{\|b - Ax\|}{\|b\|}$$

Normwise Backward Residual Error (NBRE v2)

$$\text{NBRE} = \frac{\|b - Ax\|_\infty}{\||b| + |A||x|\|_\infty}$$

Name	av. RR	av. NRBE	Failure rate
TAMU 500			
CPU	$3.06 \cdot 10^{+8}$	$3.79 \cdot 10^{-12}$	0 %
GPU	$1.62 \cdot 10^{-1}$	$3.99 \cdot 10^{-13}$	0 %
Case 118			
CPU	$1.47 \cdot 10^{+2}$	$2.25 \cdot 10^{-5}$	0 %
QR	$6.78 \cdot 10^{-2}$	$6.59 \cdot 10^{-6}$	0 %
RTS – 1 TP			
CPU	$1.22 \cdot 10^{-4}$	$1.16 \cdot 10^{-12}$	0%
GPU	$1.26 \cdot 10^{-3}$	$9.94 \cdot 10^{-13}$	0%
RTS – 2 TP			
CPU	$1.59 \cdot 10^{-4}$	$2.99 \cdot 10^{-12}$	0%
GPU	$3.78 \cdot 10^{+1}$	$2.53 \cdot 10^{-10}$	0%
ACTIVSg200			
CPU	$2.20 \cdot 10^{-5}$	$1.20 \cdot 10^{-10}$	0%
GPU	$1.68 \cdot 10^{-9}$	$1.99 \cdot 10^{-16}$	0%
ACTIVSg2000			
CPU	$1.85 \cdot 10^{+6}$	$2.35 \cdot 10^{-12}$	0%
GPU	$2.51 \cdot 10^{-5}$	$2.25 \cdot 10^{-12}$	0%
ACTIVSg10k			
CPU	$1.67 \cdot 10^{+4}$	$7.98 \cdot 10^{-11}$	0%
GPU	$5.99 \cdot 10^{-1}$	$2.84 \cdot 10^{-10}$	0%
ACTIVSg70k			
CPU	$3.67 \cdot 10^{+6}$	$2.55 \cdot 10^{-12}$	0%
GPU	$1.86 \cdot 10^{0}$	$2.69 \cdot 10^{-12}$	0%

Table 1: The error levels achieved in SSIDS. Failure rate is 0% for all the test cases.

All results presented in this document have been computed on one node of Oak Ridge OLCF summit supercomputer.

SSIDs computations can be split into three basic phases:

1. Analysis,
2. Factorization,
3. Solve.

Ipopt – one time period					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	0.0668	0.0299	0.0013	0.0980	0.1043
GPU	0.7573	1.0929	0.0049	1.8551	1.8620

Ipopt – two time period					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	0.0782	0.0450	0.0025	.1256	0.1371
GPU	0.7889	1.2320	0.0102	2.0311	$\approx$ 2.0426

TAMU 500					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	0.3938	0.2473	0.0222	0.6633	0.8265
GPU	1.0928	1.3396	0.0338	2.4662	$\approx$ 2.6294

Case 118					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	1.9697	11.7102	0.0813	13.7612	14.733
GPU	2.5132	1.8712	0.5412	4.9256	$\approx$ 5.8974

ACTIVSg200					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	0.0781	0.0200	0.0011	.0993	0.1326
GPU	0.7808	1.0678	0.0092	1.8578	$\approx$ 1.8911

ACTIVSg2000					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	0.5908	0.0616	0.0156	0.6679	0.8100
GPU	1.1456	3.8815	0.0387	5.0657	$\approx$ 5.2070

ACTIVSg10k					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	1.8797	0.6323	0.0723	2.5844	3.3630
GPU	2.4182	2.1954	0.1426	4.7562	$\approx$ 5.5348

ACTIVSg70k					
Method	Analyse	Factor	Solve	TOTAL	TOTAL with I/O
CPU	13.7829	14.4127	0.4755	28.6711	32.2804
GPU	14.4887	182.447	0.7242	197.657	$\approx$ 201.2663

Table 2: SSIDS performance on the CPU and on the GPU.