

Comparison of String Copy (zero terminated memory copy) Performance

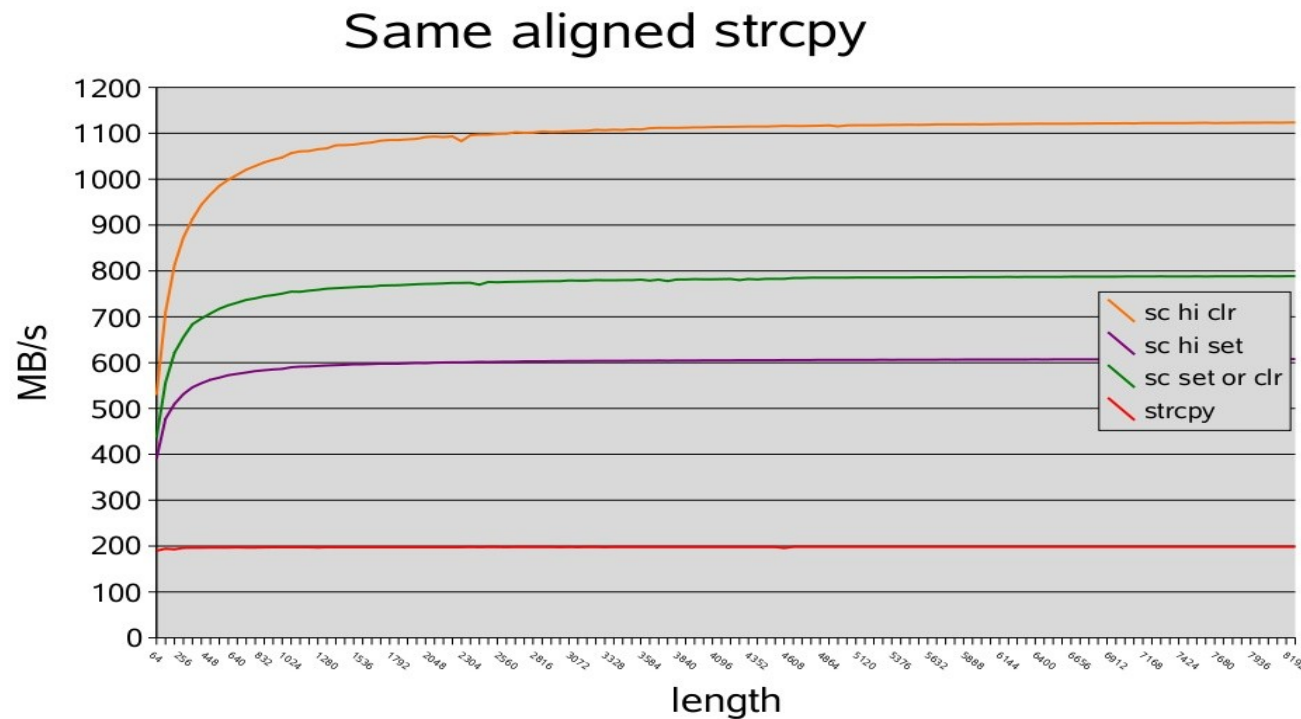
- Samara Technology Group, LLC (STG) developed a drop-in replacement string library for SiCortex MIPS-based supercomputer.
- Library can be linked with to automatically replace system string library, or called in a separate name space.
- STG's advanced strcpy (string copy) algorithms can enable greater than five-fold performance increase over system routine.
- Performance varies with data alignments and patterns.
- The following slides explore performance for the 3 most important optimization scenarios.

String copy is one of the most commonly used algorithms in all computer systems, from high performance supercomputers to embedded systems.

Like Aligned Source and Destination

- When arrays are aligned to the largest architected boundary, we can copy in bigger “chunks” to obtain maximum bandwidth. In the SiCortex architecture the largest natural alignment is double word aligned.
- “Good” natural alignment can be forced when arrays are like aligned.
- Copy speed varies depending on whether the high bit of characters is set or clear. Terminator detection is easier when this bit is clear. With Western (ASCII) text the bit is always clear so we optimize for this case.

STG's String Copy algorithm achieves a greater than 5.5 X performance win



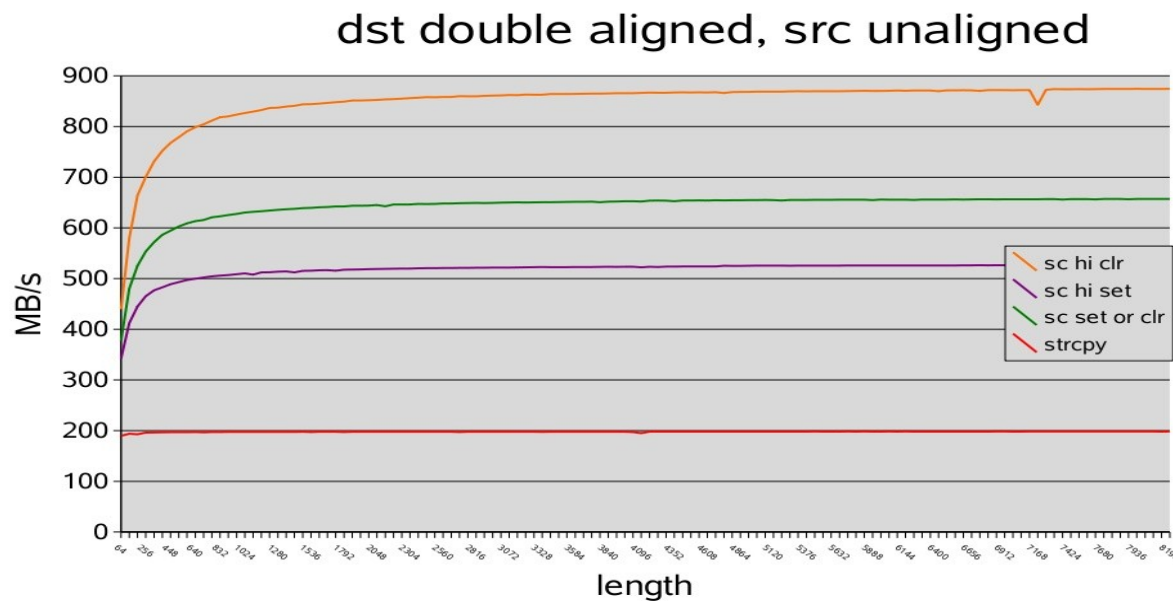
“sc” denotes the SiCortex version provided by Samara Technology.

“strcpy” is the routine provided in glibc and the Linux kernel.

Double Aligned Destination, Source Unaligned

- No natural alignment can be forced, so alignment assist instructions must be used on loads. This case is forced when both source and destination are unaligned and not like aligned.
- Copy speed varies whether the high bit of characters is set or clear.

STG's String Copy algorithm achieves a greater than 4 X performance win



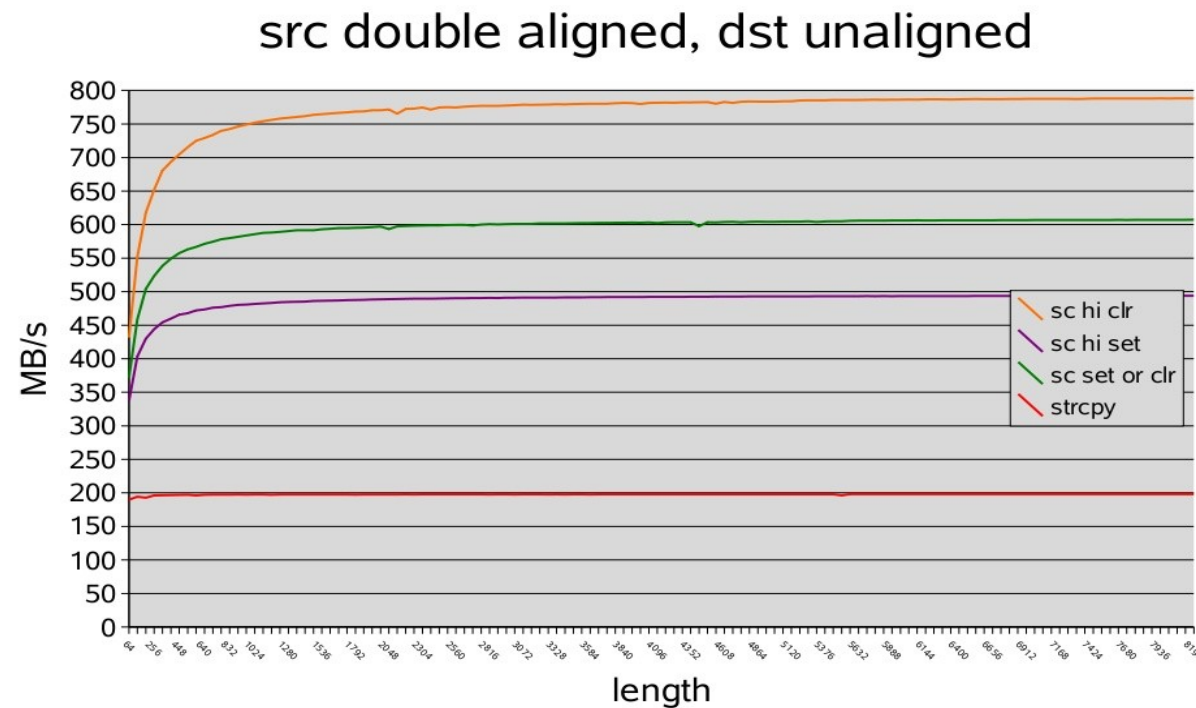
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Double Aligned Source, Destination Unaligned

- No natural alignment can be forced, so alignment assist instructions must be used on stores. This is preferable than forcing the aligned destination as it won't penalize short cases.
- Copy speed varies whether the high bit of characters is set or clear.

STG's String Copy algorithm achieves a nearly 4 X performance win



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