Experiences on 64 & 150 FPGA Systems

Olaf O. Storaasli, Oak Ridge National Lab
Dave Strenski, Cray Inc.

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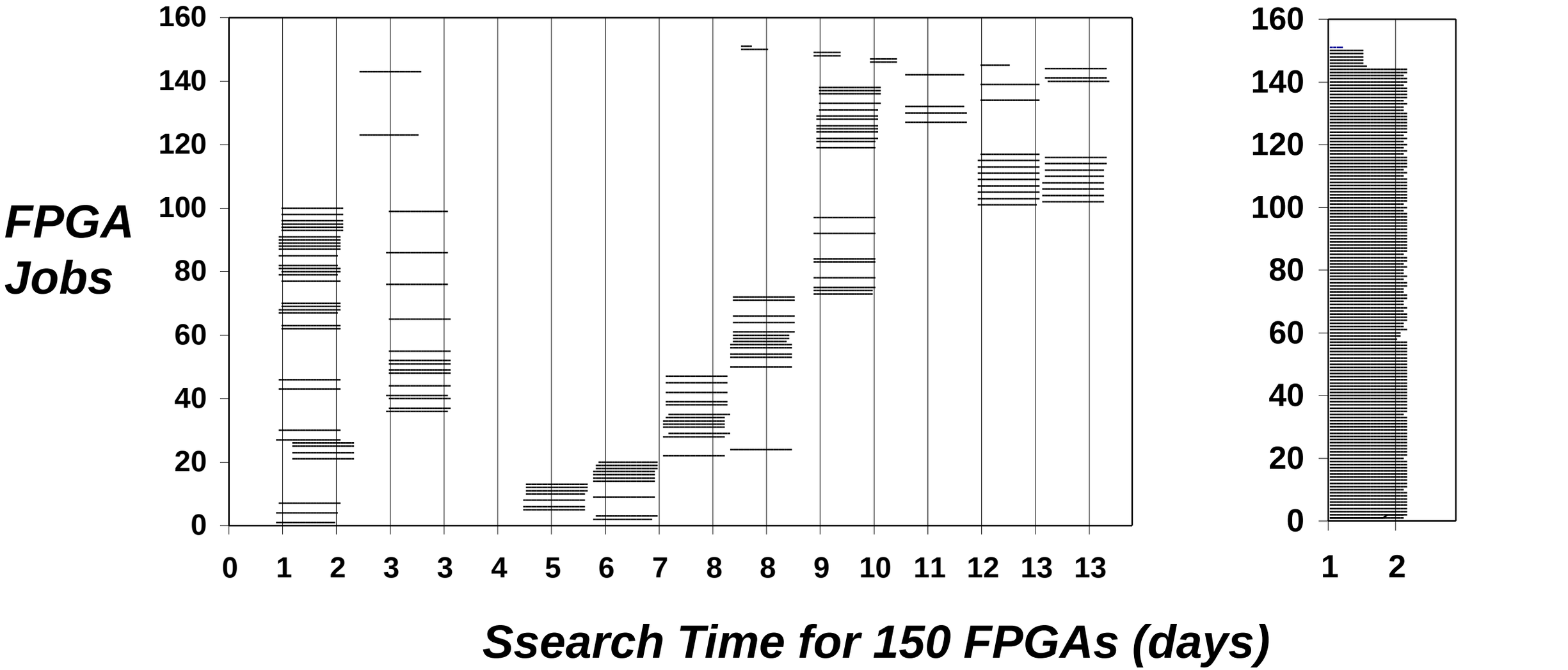
DNA Sequencing* Time on 150 FPGAs

***Human-Mouse DNA Compare (FASTA)**



DNA Sequencing: Speed* on 150 FPGAs

*State-of-the-art: **G**iga **C**ell **U**pdates **P**er **S**econd (**GCUPS**)

- DNA Characters: **Human = 155 million, Mouse = 165 million**

Total Compares = 155M x 165M x 106^2 x 2
= $51x10^{15}$ Cell Updates

- Sequential FPGA ==> 138 days (11,923,200 secs) **==> 4.3 TCUPS($51x10^{15}$/11,923,200 Tera CUPS)**
- Parallel (actual) ==> 12.9 days (1,114,560 secs) **==> 46 TCUPS**
- Parallel (dedicated) ==> 1 day (86,400 secs) **==> 605 TCUPS**

Summary: Speedup on 150 FPGAs*

1 Opteron ==> 18 years (150 mos.)

1 FPGA ==> 5 months

150 Opterons ==> 6 weeks

150 FPGAs ==> 1 day ==> 49X speedup (VirtexII)

==> *7,350X Speedup over one Opteron (VirtexIIs)*

==> 1,102,500X Speedup (Virtex4s)

***Compared to one 2.2 GHz Opteron**