

# Xeon Phi MIC system Testing

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# Terminology

- MIC = Many Integrated Cores
- Xeon Phi = Intel's MIC system
  - 60 cores, 1GHz on a PCIe x16 card
  - Other names: Knight's Ferry, Knight's Corner, Knight's Landing
  - Original project: Larrabee
    - Attempt to make GPU from older x86 design
- SIMD = Single Instruction Multiple Data (a.k.a vector)
  - MMX            64-bits        1996
  - SSE1-SSE4    128-bits      1999, 2001, 2004, 2007
  - AVX            256-bits      2011
  - IMCI           512-bits      2012      <----- Intel Xeon

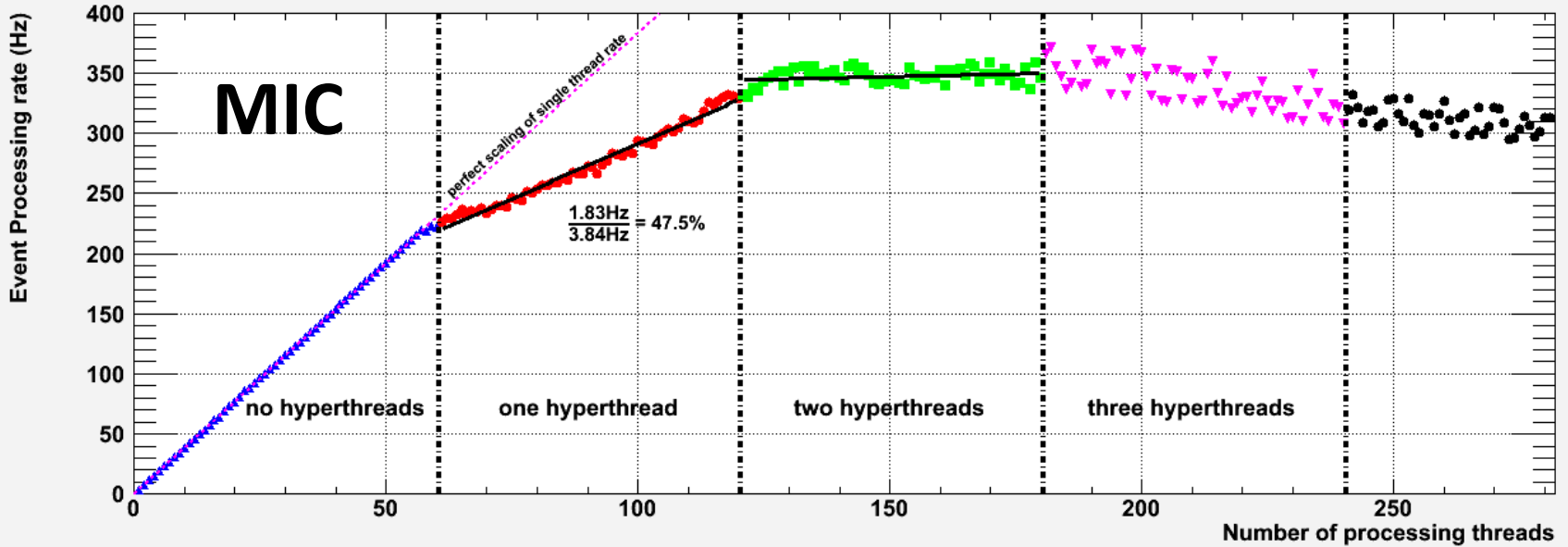


# Some System details

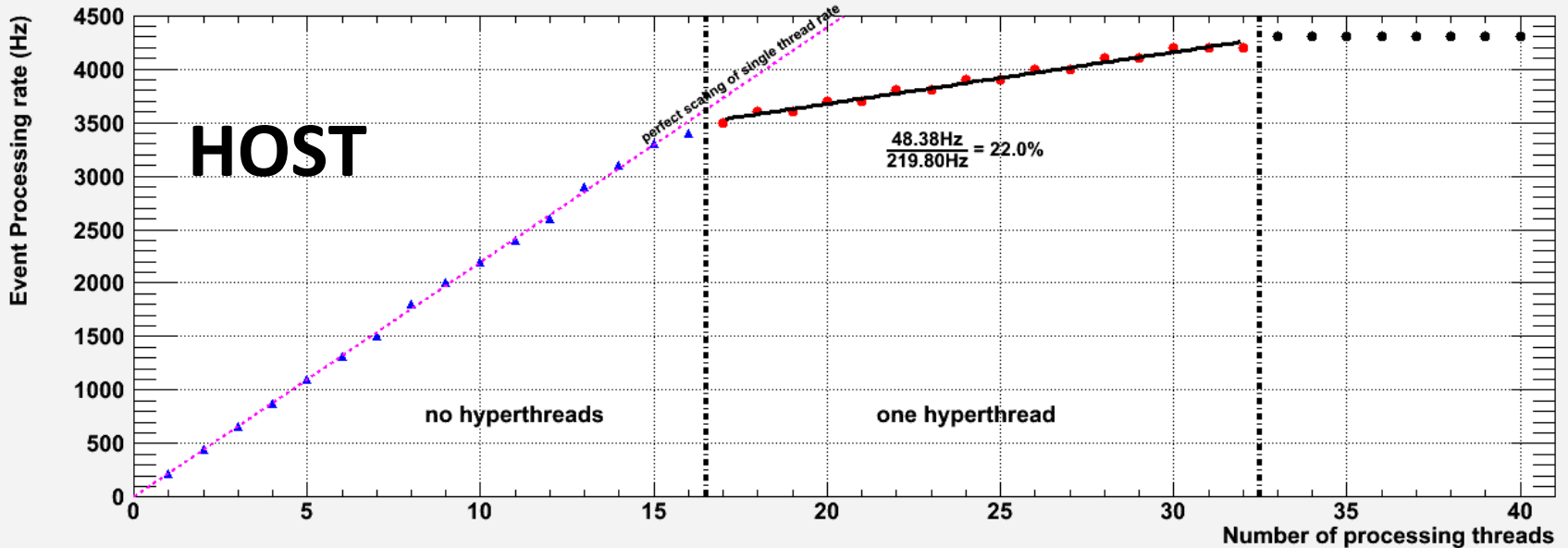
- Linux variant runs on MIC card independent of host OS
  - MIC system is based on 2.4 Linux kernel
  - File system not automatically shared
    - MIC cards can be configured to mount host's filesystem via NFS
- Intel provides tools to run on host so logging into MIC system is not always necessary
- Must use intel-provided cross-compiler to build executables
  - Could not build sim-recon because ROOT was needed
  - Could not build ROOT because libX11-devel was needed
  - ....
- So, ... JANA was built using cross-compiler and the included testing facility was used

# Performance using JANA TestSpeed plugin

Multi-threaded JANA Test on MIC




Multi-threaded JANA Test on HOST



# Results

- Lack of full Linux development platform is a real limitation for us
  - Possible solutions:
    - Use Intel cross-compiler to build libX11 and all other dependencies so ROOT can be compiled
    - Build a native compiler so compilation can be done on MIC
    - Install a host OS that is binary compatible with MIC architecture
    - Virtualization?
- Single thread rate is 50 times slower on MIC than Host
  - Compiler optimization?



May not use  
the 512bit  
SIMD vectors

# Summary

- HPC group has invested some time to develop expertise with these devices. They think they will use them for next generation HPC farm
- A single box with 240 real cores (1GHz) has a lot of computational ability
  - Leveraging this will take some investment on our part (doesn't come for free!)
  - Univ. of Regina CS grad student looking into this