

# AUTOTUNING HLS FOR FPGAS USING OPENTUNER AND LEGUP

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1. FPGAs, HLS & Autotuning
2. Background
3. Experiments & Results
4. Conclusion



The slides and all source code are hosted at [GitHub](#):

- [Code & Data](#): `github.com/phrb/legup-tuner`
- [Slides](#): `github.com/phrb/slides-reconfig-2017-autotuning`

## FPGAs:

- Logic Blocks and Interconnections
- Reconfigurable

## Tradeoff:

- Energy Efficiency and Performance
- Programmability



## Using FPGAs in Bing:

1,632 Servers with FPGAs Running Bing Page Ranking Service (~30,000 lines of C++)

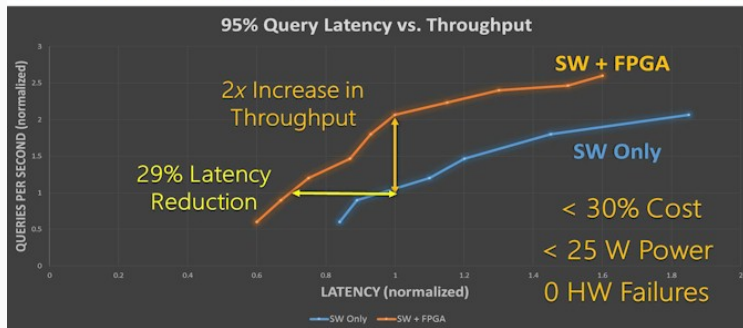


Image: [enterprisetech.com/2014/09/03/microsoft-using-fpgas-speed-bing-search/](http://enterprisetech.com/2014/09/03/microsoft-using-fpgas-speed-bing-search/) [Accessed in 27/11/17]

# FPGAs: HIGH-LEVEL SYNTHESIS

## LegUp HLS flow:

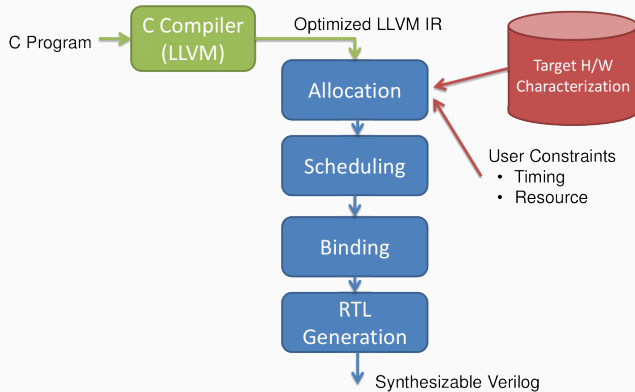


Image: Canis, Andrew Christopher. LegUp: Open-Source High-Level Synthesis Research Framework. Diss. University of Toronto, 2015.

# FPGAs: HIGH-LEVEL SYNTHESIS

HLS can generate **lower-latency applications**:

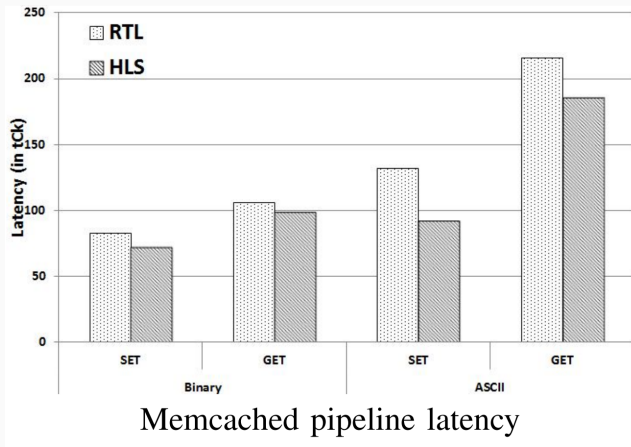


Image: Karras, Kimon, Michaela Blott, and Kees Vissers. "High-Level Synthesis Case Study: Implementation of a Memcached Server." arXiv preprint arXiv:1408.5387 (2014).

# FPGAs: HIGH-LEVEL SYNTHESIS

Qualitatively, with less effort:

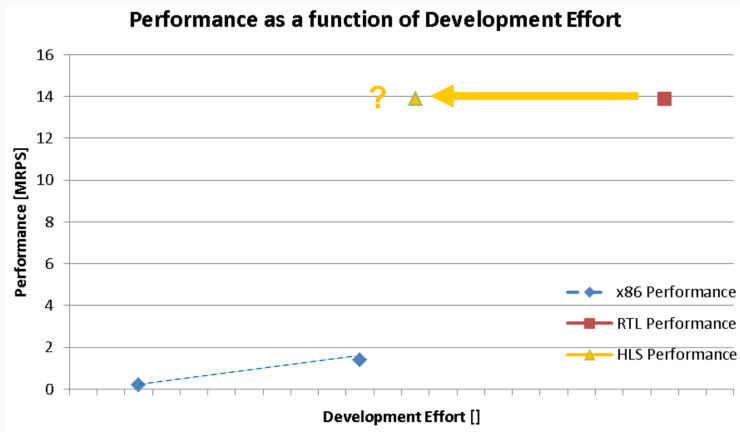


Image: Blott, Michaela, et al. "Achieving 10Gbps line-rate key-value stores with FPGAs." Presented as part of the 5th USENIX Workshop on Hot Topics in Cloud Computing. 2013.



This is an **old issue**:

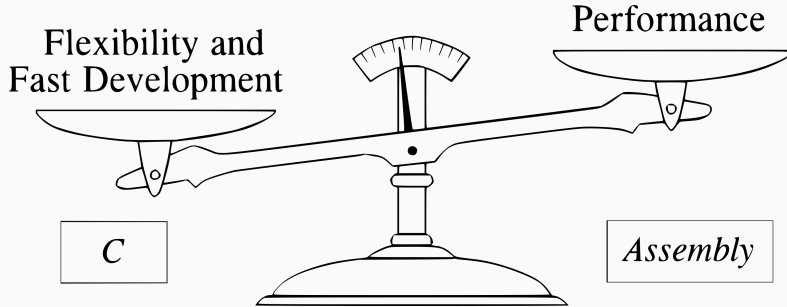


Image: Smith, Steven W. "The scientist and engineer's guide to digital signal processing." 1997

Why use autotuning for HLS?

Compare with Huang's work

Describe Xu's work with OpenTuner

Describe CHStone and Metric Composition Strategy

Describe the four scenarios

**Present the heatmaps for each optimization scenario**

Discuss the issues with the weighted cost function



Discuss all future work topics

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