Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

MOHAMMAD ALKHAMIS

BASc (University of Ottawa, 2012)

“Accelerating cn.MOPS with GPU”

Department of Electrical and Computer Engineering

May 15, 2017
11:00 A.M.
Engineering Office Wing
Room 430

Supervisory Committee:
Dr. Amirali Baniasadi, Department of Electrical and Computer Engineering, University of Victoria (Supervisor)
Dr. Nikitas Dimopoulos, Department of Electrical and Computer Engineering, UVic (Member)

External Examiner:
Dr. Alex Thomo, Department of Computer Science, UVic

Chair of Oral Examination:
Dr. Marco Cozzi, Department of Economics, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract
cn.MOPS is a model-based algorithm used to quantitatively detect copy-number variations in next-generation, DNA-sequencing data. The algorithm is implemented as an R package and can accelerate processing with multi-CPU parallelism. For very large data sets, however, cn.MOPS requires many CPU cores and a large memory space to significantly reduce execution time. In this thesis, an alternative mechanism of parallelism is proposed. Using one CPU core and a GPU device, the proposed solution, gcn.MOPS, delivered the equivalent performance of cn.MOPS running on 237x CPU cores and decreased memory usage by more than half.