



**University
of Victoria**

Graduate Studies

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

of

FRANCIS HARRISON

BSc (University of Victoria, 2015)

“Reference Coupling: A Method for Identifying Software Ecosystems of
Technically Dependent Projects”

Department of Computer Science

Friday, November 13, 2015

10:30 A.M.

Engineering and Computer Science Building
Room 548

Supervisory Committee:

Dr. Daniela Damian, Department of Computer Science, University of Victoria (Co-Supervisor)

Dr. Kelly Blincoe, Department of Computer Science, UVic (Co-Supervisor)

Dr. Sudhakar Ganti, Department of Science, UVic (Member)

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Dr. Daniela Constantinescu, Department of Mechanical Engineering, UVic

Chair of Oral Examination:

Dr. John Volpe, Department of Environmental Studies, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

Software projects are not developed in isolation. Open source software projects encourage a networked collaboration and interdependence across projects and developers. Recent research has shifted to studying software ecosystems, communities of projects that depend on each other and are developed together. However, identifying technical dependencies at the ecosystem level can be challenging. In this dissertation, we propose a new method, known as reference coupling, for detecting technical dependencies between projects. The method establishes dependencies through user specified cross-references between projects. We use our method to identify ecosystems in GitHub hosted projects, and we identify several characteristics of the identified ecosystems. Our findings show that most ecosystems are centered around one project and are interconnected with other ecosystems. The predominant type of ecosystems are those that develop tools to support software development. We also found that the project owners' social behavior aligns well with the technical dependencies within the ecosystem, but project contributors' social behavior does not align with these dependencies. We conclude with a discussion on future research that is enabled by our reference coupling method.