

ICSE 2012

目錄

Contents

- June 6
 - Keynote 1
 - Cost Estimation for Distributed Software Project
 - Characterizing Logging Practices in Open-Source Software
 - Combine Functional and Imperative Prgm for Multicore Sw: Scala & Java

- Sound Empirical Evidence in Software Testing
- Identifying Linux Bug Fixing Patch
- Active Refinement of Clone Anomaly Reports
- June7
 - Keynotes 2: Sustainability with Software - An Industrial Perspective
 - Green IT
 - What can we do?
 - Green by IT
 - On How Often code is cloned across repositories
 - Graph-based analysis and prediction for sw evolution
 - graph are everywhere
 - predictors
 - Conclusion
 - What make long term contributors: willingness and opportunity in OSS
 - approach
 - summeray
 - develop of auxiliary functions: should you be agile?
 - experiment
 - research questions
 - result
 - Static Detection of Resource Contention

Problems in Server-side script

- Amplifying Tests to Validate Exception Handling Code
- A tactic-centric approach automating traceability of quality concerns

June 6

Keynote 1

沒怎麼聽懂，只記得講到了finance is not money但是沒聽懂這個和軟件有什麼關係。

Cost Estimation for Distributed Software Project

講到他們試圖改善現有的模型去更精確地評估軟件開發的開銷。

他們會給PM建議之前的項目的歷史數據，然後對於新項目，他們建議歷史上已有的項目的數據，從而幫助PM得到更精確的評估。他們試圖儘量減少項目評估對

PM 的經驗的需求，從而幫助即使經驗很少的PM也能準確評估項目的開銷。

他們的觀點：

Context-specific solutions
needed!

我們需要更上下文相關的解決方案！

Early user participation is key!

早期用戶的參與是關鍵

Characterizing Logging Practices in Open-Source Software

Common mistakes in logging messages

在日誌記錄中容易犯的錯誤

他們學習了歷史上的log記錄，然後試圖找到重複修改的輸出log的語句，確定log中存在的問題。他們首先確定修改是事後修改。

通常的修改的比例（9027個修改）

45% 靜態文本

27% 打印出的變量

26% 調試等級verbosity

2% 日誌輸出的位置

他們發現有調試等級的變化，是因為安全漏洞之類的原因，或者在開銷和數據 之間的權衡。

大多數對log的變量的修改都是為了增加一個參數。他們之前的LogEnhancer是為了解決這個問題而提出的，通過靜態檢查，提醒程序員是否忘記了某個參數

對text的修改是因為要改掉過時的代碼信息，避免誤導用戶。

他們的實驗是採用了基於code clone 的技術，找到所有log語句，然後找不一致的clone，然後自動提出建議。

Combine Functional and Imperative Pgrm for Multicore Sw: Scala & Java

趨勢：到處都是多核，但是併發程序呢？

他們研究的對象是Scala和Java，因為可以編譯後確認JVM字節碼的語義。

- **Java:**

- 共享內存
- 顯示創建的線程
- 手動同步
- Wait/Notify機制

- **Scala:**

- 高階函數
- Actors, 消息傳遞
- lists, filters, iterators
- while
- 共享狀態, OO
- import java.* 能從java導入任何庫
- auto type inference 自動類型推導

實驗的參與者都經過4周的訓練，實驗項目是工業等級的開發項目

結果：

scala 的項目平均比java多花38%的時間，主要都是花在Test和debug上的時間。

程序員的經驗和總體時間相關，但是對test和debug沒有顯著影響。

scala的爲了讓編程更有效率的設計，導致debug更困難。比如類型推導，debug 的時候需要手動推導，來理解正在發生什麼。

scala的程序比java小，中位數2.6%，平均15.2%

- **性能比較：**
 - 單核：scala的線性程序的性能比java好
 - **4核：**
 - scala 7s @ 4 threads
 - java 4s @ 8 threads
 - **median**
 - 83s scala
 - 98s java
 - 32core: best scala 34s @ 64 threads
- **結論**
 - java有更好的scalability
- **scala類型推導**
 - 45%說對攜帶碼有幫助
 - 85%說導致程序錯誤
- **調試**
 - 23%認為scala簡單
 - 77%認為java簡單

multi-paradigam are better

Sound Empirical Evidence in Software Testing

Test data generation 測試數據自動生成

Large Empirical Studies - not always possible

For open source software - big enough

Identifying Linux Bug Fixing Patch

- **current practice:**
 - manual
- **Current research:**
 - keywords in commits
 - link bug reports in bugzilla

Try to solve classification problem

- **issue**
 - pre-identified
 - post-identified
- **data**
 - from commit log
- **feature extraction**
 - text pre-process stemmed non-stop words

- model learning

research questions

Active Refinement of Clone Anomaly Reports

motivating

- code clones, clone groups
- clone used to detect bugs
- anomaly : inconsistent clone group many anomaly clone are not bug, high false positive

approach

- reorder by sorted bug reports
-

June7

Keynotes 2: Sustainability with Software - An Industrial Perspective

Sustainability

- **Classic View: Independent view with overlap**
 - Social
 - Environment
 - Economic
- **Nested view**
 - **Environment**
 - **Social**
 - Economic

Triple bottom line

- **economic**
 - global business, networks , global econ
- **env**
 - natural res, climate change, population grow
- **social**
 - awareness, connectivity, accountability

Green IT

- **reduce IT energy**
 - more than 50% cooling - doing nothing
- **mini e-waste: not properly recycled**
 - 80% in EU
 - 75% in US
- foster dematerialization

In-Memory Technology: Expected Sustainable Benefits

What can we do?

- consider all software lifecycle phases in your design
- avoid energy expensive behavior in your codes
- design lean architectures

Green by IT

- 2% green IT
- 98% green IT

On How Often code is cloned across repositories

Line based hashing code clone detection

never do anything harder than sorting

hashing a window of 5 lines of normalized
(tokenized) code, dropping 3/4 of the hashing

把ccfinder一個月的工作縮短到了3, 4天。沒有比較
presion和recall。

14% type1

16% type2

17% type3 (not really type2)

Graph-based analysis and prediction for sw evolution

graph are everywhere

- internet topology
- social net
- chemistry
- biology

in sw - func call graph - module dependency graph

developer interaction graph - commit logs - bug reports

experiment 11 oss, 27~171 release, > 9 years

predictors

- **NodeRank**
 - similar to pagerank of google
 - measure relative importance of each node
 - **func call graph with noderank**
 - compare rank with severity scale on bugzilla
 - **correlation between noderank and BugSeverity**
 - func level 0.48 ~ 0.86 varies among projects.
 - model level > func level

- **ModularityRatio**

- cohesion/coupling ratio:
 $\text{IntraDep}(M)/\text{InterDep}(M)$
- forecast maintenance effort
- **use for**
 - identify modules that need redesign or refactoring

- **EditDistance**

- bug-based developer collaboration graphs
- $\text{ED}(G1, G2) = |V1| + |V2| - 2|V1 \cap V2| + |E1| + |E2| - 2|E1 \cap E2|$
- **use for**
 - release planning
 - resource allocation

graph metrics

- **graph diameter**

- average node degree indicates reuse

- clustering coefficient
- assortativity
- num of cycles

Conclusion

.....

"Actionable intelligence" from graph evolution

- studie 11 large long-live proj's
- predictors
- identify pivotal moments in evolution

What make long term contributors: willingness and opportunity in OSS

OSS don't work without contributors form community

mozilla (2000-2008)

$10^{2.2}$ LTC <- 2 order -> $10^{4.2}$ new contributors
<- 3.5 order -> $10^{7.7}$ users

gnome (1999-2007)

$10^{2.5}$ LTC <- 1.5 order -> $10^{4.0}$ new contributors
<- 3.5 order -> $10^{6.5}$ users

approach

- read issues of 20 LTC and 20 non-LTC
- suvery 56 (36 non-LTC and 20 LTC)
- extract practices published on project web

sites

summeray

- Ability/Willingness distinguishes LTCs
- **Environment**
 - **macro-climate**
 - popularity
 - **micro-climate**
 - attention
 - number of peers
 - performance of peers

regression model

newcomers to LTC conversion drops

actions in first month predicts LTCs

- 24% recall
- 37% precision

develop of auxiliary functions:
should you be agile?

a empirical assessment of pair programming and test-first programming

can agile help auxiliary functions?

experiment

- pair vs solo
- test-first vs test-last
- students vs professors

research questions

- r1: can pair help obtain more correct impl
- r2: can test-first
- r3: dst test1 encourage the impl or more test cases?
- r4: does test1 course more coverage

result

- **test-first**
 - higher coverage
 - non change with correctness
- **pair**
 - improve on correctness

- longer total programming time

Static Detection of Resource Contention Problems in Server-side script

Addressed the race condition of accessing database or filesystem of PHP

Amplifying Tests to Validate Exception Handling Code

異常處理的代碼不但難寫，而且難以驗證。各種組合情況難以估計，尤其是手機系統上。

A tactic-centric approach automating traceability of quality concerns

tactic traceability information models

