8-14-2015

Software Metrics and Dashboard

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Recommended Citation
Shilpika, Thiruvathukal, George K.; Aguiar, Saulo; Läufer, Konstantin; and Hayward, Nicholas J.. Software Metrics and Dashboard (2015). Retrieved from Loyola eCommons, Computer Science: Faculty Publications and Other Works,
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About Software Metrics
- Computed from one or more measured values
- A critical tool that provides continuous insight to products and processes
- Helps build reliable software in mission-critical environments
- The two types of metrics relevant to our work are
  - Computing metrics: intrinsic code properties like code complexity
  - In-process metrics: information that can provide insight into the underlying software development process

Approach
1. Evaluate whether CSE teams find the metrics dashboard useful.
2. Assess how metrics are used and which general classes/types of metrics will be useful in CSE (Computational Science and Engineering) projects.
3. Implement dashboard based on metrics derived from information collected by the tools (Griffith and Bitbucket) used by projects.
4. Add new metrics as they become necessary.
5. Use Apache Spark, a cluster computing platform which serves as a general purpose engine for large scale data processing.

Preliminary Results
The metrics dashboard is developed using modern web development methodologies like Spray in Scala which provides claim-server side REST/HTTP support on top of Akka.

Future Work
We will ensure the metrics dashboard is properly instrumented to allow actual usage of the tools to be determined as projects collectively take advantage of them.

Conclusions
Building appropriate sets of metrics, presented in a useful way, can prove beneficial to CSE software teams, large, small and solo.

Facilitating the production of quality software would be a key component for developing and maintaining CSE software, especially as other mission-critical projects grow to depend on it.

In this project, we take steps to introduce a pragmatic set of metrics into CSE software projects by conducting surveys, building a metrics dashboard, and performing analysis and post-surveys on selected projects.

For interactive exploration of Metrics information and reduction in computation overhead the datasets are partitioned into clusters in a distributed environment which introduces concurrency and independent failures/recovery of partitioned tasks.

Defect Density = Number of Defects / Module Size

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<th>Month</th>
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<th>KLOC</th>
<th>Issues</th>
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</tr>
</tbody>
</table>

Defect density for a given project in a Github repository is calculated as

\[
\text{Defect Density} = \frac{\sum \text{Issues}}{\sum \text{KLOC}}
\]

\[
\sum \text{KLOC} = \sum f(i) \times \text{KLOC}(f(i),m_t)
\]

\[
\sum \text{Issues} = \sum f(i) \times \text{Issues}(f(i),m_t)
\]

References
- http://spray.io/introduction/spray-for-web-development/
- Scala and Akka
- D3 JavaScript library
- Akka Scala Documentation
- Spray toolkit for Apache Spark
- HTTP server for web development

Acknowledgements: This material is based upon work supported by the National Science Foundation under Grant No. 1403347.

Bibliography