

**Final Project Presentation**

**VARIATION OF DEFECTS AND COMPLEXITY  
IN MULTIPLE VERSIONS OF OPEN-SOURCE  
PROJECTS**

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**June, 2009**

# BACKGROUND

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## ✘ Card and Glass

- + Structural oriented software
- + Pre delivery defects

## ✘ Normi and Clive

- + Object oriented software
- + Post delivery defects

# DEFINITIONS

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- ✘ Structural Complexity (Fanout or CBO)
  - + Fanout is the number of local flows out of a module plus the number of data structures that are used as output.
- ✘ Data Complexity (Numbers of parameters)
  - + Data complexity of a module is the number of data items (variables) it is expected to process.
- ✘ Procedural/ Cyclomatic Complexity
  - + It's the measure of control flow within the module.
- ✘ System Complexity
  - + Structural Complexity + Data complexity

# METRICS TOOL VALIDATION

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## ✘ Tool tested:

- + Chidamber & Kemerer Java Metrics (CKJM)
- + JStyle
- + JHawk
- + Resource Standard Metrics (RSM)

## ✘ Outcome/Result

- + JHawk gives Fanout, CBO and number of parameter values closer to our manual calculation.
- + JStyle gives value closer to our value for Cyclomatic complexity

# SOFTWARE SYSTEM DATA ANALYSIS

## ✘ Step 1:

- + Selecting and downloading versions of 5 open source Java software
- + Feeding source code of different software version to JHawk/JStyle
- + Collecting post-delivery defects information

## ✘ Step 2:

- + Data analysis to find trend and relationship for all data collected







# SOFTWARE SYSTEM DATA ANALYSIS (4)

Software Product	Reported post delivery Defects v/s Versions	Reported post delivery v/s System Complexity	Number of Downloads v/s Versions	Reported post delivery Defects v/s Number of Downloads	Reported post delivery Defects per Number of Downloads v/s Versions
ZK	Positive	Positive	Positive	Positive	Positive
DataCrow	Positive	Negative	Positive	Negative	Negative
Saxon	Positive	Positive	Positive	Negative	Positive
LaTeXDraw	Negative	Negative	Positive	Negative	Negative
HTMLUnit	Positive	Positive	Positive	Positive	Negative
Majority	+	+	+	--	--





# CONCLUSION & FUTURE WORK

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- ✘ JHawk and JStyle gives value closer to our manual calculation.
- ✘ Successfully shown the use of metrics-calculating tools to find correlation between
  - + System complexity and different version releases
  - + Reported number of defects and different version releases
  - + System complexity and reported number of defects
  - + Cyclomatic complexity and different version releases
- ✘ Future work includes extension of the work, by considering more than five open source Java software.

**THANK YOU**

**QUESTIONS???**