

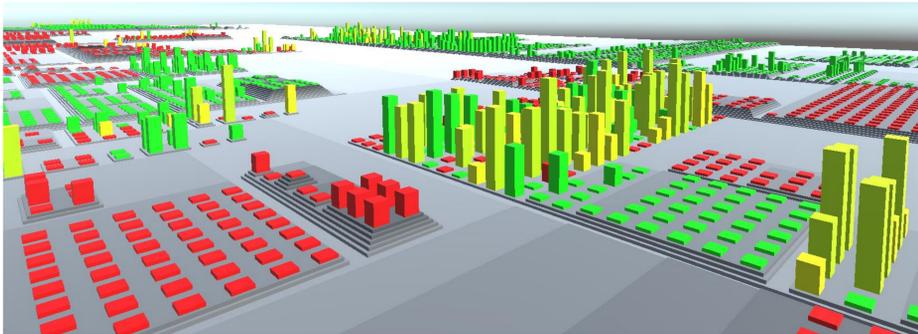
# An Analytical View of Test Results Using CityScapes

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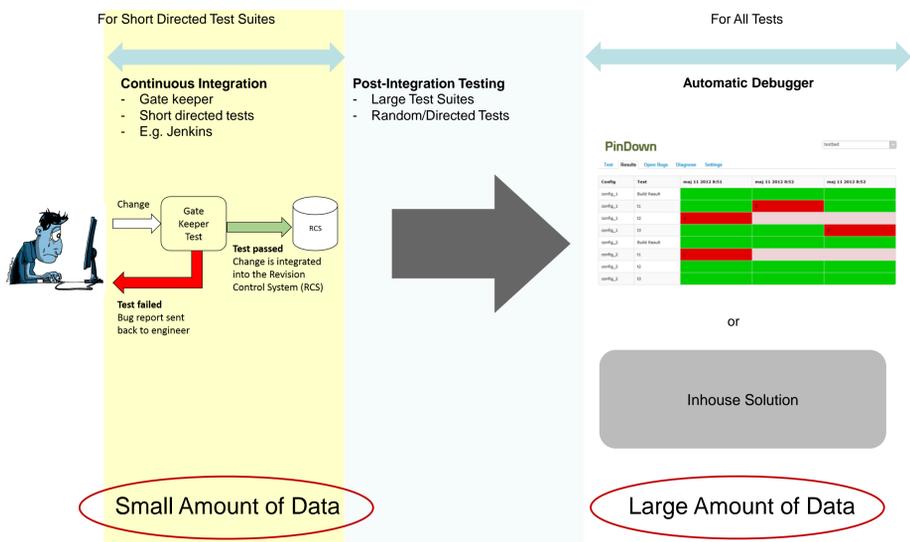
## Introduction

We map 5 months of test results from a real ASIC project on to the file structure of the design under test and testbench and present it as a cityscape.



- Each house is a file,
- The height reflects the number of commits to the file
- The color reflects the fraction of bad commits

## Input Data: Bad vs Good Commits



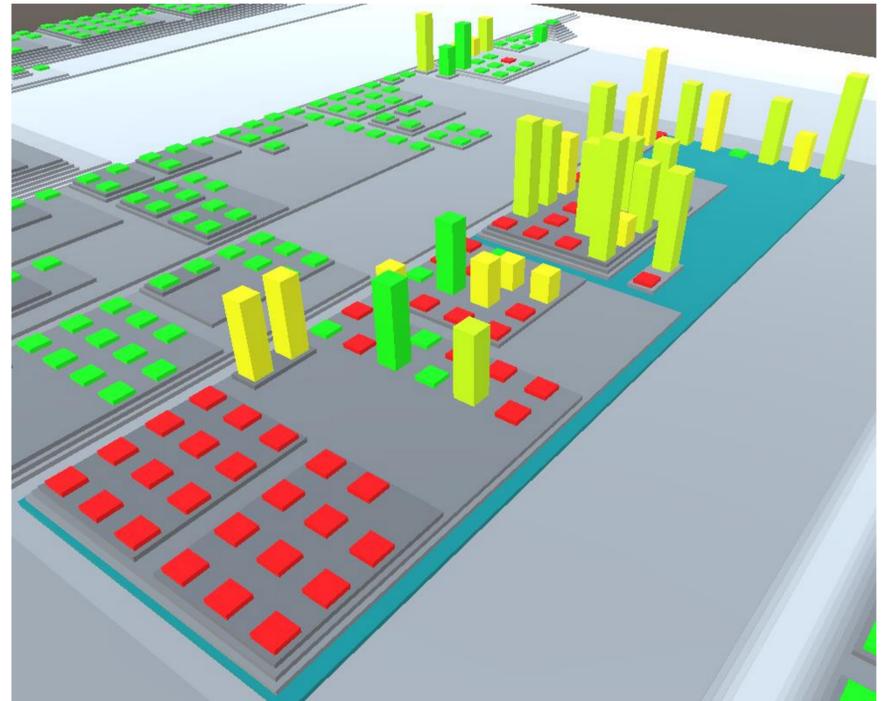
The input data is simple: a list of bad commits, generated by either:

- a continuous integration tool (for short directed test suites) or
- an automatic debugger like PinDown (for all tests).

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PinDown Bug Report:
Bug No: 1 (new bug)
PinDown made the failing test pass again by only removing the bad commit. This was done locally, nothing was committed.
Test: ah_opa_seed_14829533
Build: build_90e
Error:
$monitor at time=3718180: HEH_ADDR= h00c1 HEH_DATA_OUT= h30
$monitor at time=3718380: HEH_ADDR= h0000 HEH_DATA_OUT= h00
$monitor at time=3718980: HEH_ADDR= h00c1 HEH_DATA_OUT= h30
$monitor at time=3719180: HEH_ADDR= h00c2 HEH_DATA_OUT= h30
$monitor at time=3719380: HEH_ADDR= h00c3 HEH_DATA_OUT= h30
pilot-test-results ..... FAILED: ALU operation failed .....
pilot-test-time time=3719440
Validated: true
Committer: praveen
Commit Message:
Merged development branch into main trunk
Committed Files (124 files in total, but the bug has been narrowed down to this file):
file: /124/repository_source/trunk/rtd/danpath.v
Changes (shown if small):
assign daa7 = (daa14 && daa_h5) || (daa15 && daa_h6) || daa_h7;
assign daa_out = (daa7, daa6, daa5, daa4, daa3, daa2, daa1, 1'b0);
assign carry_daa =
{
  {daa11 && daa_h1 || daa_h2} || {daa12 && daa_h2 || daa_h3} ||
  {daa13 && daa_h1 || daa_h4} || {daa14 && daa_h5} ||
  {daa15 && daa_h3 || daa_h2};
};
interrupt/restart address generator
*/
```

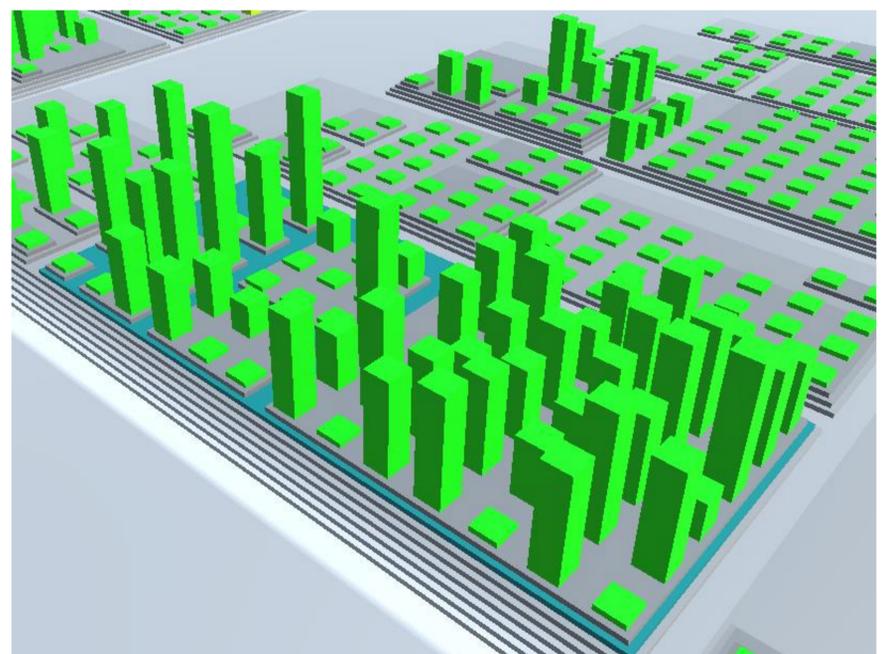
## Results

### Identifying Error-Prone Areas



- An error-prone area has a higher fraction of bad commits (not so much green) than average
- This folder (part of the test bench) has 14% bad commits compared with the project average of 4% bad commits.

### Identifying Test Coverage Holes



- An area that is not covered by tests has a lot of activity (tall houses) but never any failures (all green)

This work has been financially supported by the ITEA3 initiative TESTOMAT Project ([www.testomatproject.eu](http://www.testomatproject.eu)) through Vinnova – Sweden's innovation agency.