

PROTEUM e ESTUDOS EXPERIMENTAIS EM TESTE DE SOFTWARE

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Origem

- Oficialmente criada em 1993 (há 21 anos)
- Versão 2 - incorpora testes por meio de scripts (robustez e produtividade)
- Versão IM - interface mutation e algumas melhorias, principalmente de performance (published on IEEE TSE)

Utilização

- Mestrado/doutorado
- Outros mestrados/doutorados
- Pesquisadores mundo todo
- Pós-doc 2013

GUIs - wizard

View Test Case

Test Case:

Status: Enable Disable

Parameters:

Exec.Time (1/100 Sec):

Return Code:

STDIN:

STDOUT:

```
November 2013
S M Tu W Th F S
          1  2
 3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
```

STDERR:

GUI - funcionalidades

- Script em Tcl/Tk
- Ler parâmetros
- Chamar programas
- Tratar e apresentar resultados

GUI - casos de teste

```
delamaro@note-Dell: ~/Cal
Arquivo Editar Ver Pesquisar Terminal Ajuda
delamaro@note-Dell:~/Cal$
delamaro@note-Dell:~/Cal$ tcase -l Cal

Teste Case # 1 0
Label:
    ENABLED
    Exec. Time (CPU): 10
    Exec. Time (total): 11
    Return Code: 0
    Parameters:
    Input Size: 0
    Output Size: 144
    Stderr Size: 0
    Input:

    Output:
    November 2013
    S  M Tu  W Th  F  S
                1  2
    3  4  5  6  7  8  9
   10 11 12 13 14 15 16
   17 18 19 20 21 22 23
   24 25 26 27 28 29 30

    Stderr:

Traversed blocks:
delamaro@note-Dell:~/Cal$
```

Scripts

- Integração por meio de chamadas de sistema

```
CreateOneExperiment.py (-~/GMU/Min-Muta/Programs) - gedit
Arquivo Editar Ver Pesquisar Ferramentas Documentos Ajuda
Abrir Salvar Desfazer

CreateOneExperiment.py x
13 r = os.chdir(program)
14 print os.system('pwd')
15
16 # create the test session
17 os.system('test-new -research -C "gcc driver.c ' + program + '.c -o ' + program + ' -w -lm "'
+ program)
18 os.system('instrum -EE ' + program + ' __' + program)
19 os.system('instrum -build ' + ' __' + program + ' ' + program)
20
21 # import test cases from a text file
22 # each line has a comand line parameter
23 tsetname = "testset.txt"
24 if ( not os.path.exists(tsetname)):
25     EquivFile = open(tsetname, "w")
26     EquivFile.close()
27
28 TcaseFile = open(tsetname, "r")
29 for OneTestCase in TcaseFile:
30     param = OneTestCase.strip(" \n")
31     statement = 'tcase-add -timeout 300 -trace -p "' + param + '" -EE __' + program +
"_inst " + program
32     print statement
33     os.system(statement)
34 TcaseFile.close();
35
36 # generate mutants for each of the functions to be tested
37 # the name of the functions ar stored in the file
38 # uses only conventional operators. exclude delete operators
39 FunctionNameFile = open("functions.txt", "r")
40 for FunctionName in FunctionNameFile:
```

Python ▾ Largura da tabulação: 8 ▾ Lin 35, Col 1 INS

Experimentação

- Modo research ou test
- Geração de relatórios variados (vivos, mortos, equivalentes, time-outs, scores, etc)
- Velocidade de execução
- Geração dos GFCs das unidades

O que falta?

- Integração com cUnit (assertivas)
- Identificação mutantes equivalentes
- Geração automática de dados (casos) de teste
- Execução distribuída dos mutantes

Artigos - 2014

- PAPADAKIS, Mike ; Delamaro, Marcio ; TRAON, Yves Le . Mitigating the effects of equivalent mutants with mutant classification strategies. Science of Computer Programming (Print), 2014.
- Delamaro, Marcio Eduardo ; DENG, Lin ; DURELLI, VINICIUS HUMBERTO SERAPILHA ; LI, Nan ; OFFUTT, Jeff . Experimental Evaluation of SDL and One-Op Mutation for C. In: 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation (ICST), 2014, Cleveland. 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation. p. 203-n/a.
- Delamaro, Marcio Eduardo ; OFFUTT, Jeff ; AMMANN, Paul . Designing Deletion Mutation Operators. In: 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation (ICST), 2014, Cleveland. 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation. p. 11-n/a.
- AMMANN, Paul ; Delamaro, Marcio Eduardo ; OFFUTT, Jeff . Establishing Theoretical Minimal Sets of Mutants. In: 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation (ICST), 2014, Cleveland. 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation. p. 21-n/a.
- KURTZ, Bob ; AMMANN, Paul ; DELAMARO, Márcio Eduardo ; OFFUTT, Jeff ; DENG, Lin . Mutant Subsumption Graphs. In: 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation Workshops (ICSTW), 2014, OH. 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation Workshops. p. 176-185.
- DELAMARO, Márcio Eduardo ; OFFUTT, Jeff . Assessing the Influence of Multiple Test Case Selection on Mutation Experiments. In: 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation Workshops (ICSTW), 2014, OH. 2014 IEEE Seventh International Conference on Software Testing, Verification and Validation Workshops. p. 171-175.

Outros projetos - CCSL

- **Jabuti** - teste estrutural de programas Java
- **O-Flm/CO** - Oracles for images and Complex Outputs
- **VETesting** - teste baseado no grafo de cena em ambientes virtuais
- **Apolom** - oráculos para sistemas simulink
- **Pascal Mutants** - ferramenta mutação e teste estrutural para Pascal
- **JTUF e JFTool** - ferramentas desenvolvidas na disciplina de teste
- **Tetoods** - geração combinatorial

OBRIGADO!

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