Janus Manager
the Self-Improving Software System

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50th Crest Open Workshop
Genetic Improvement
Overview

- Janus Manager - Daily activity
- Genetic Improvement - Nightly activity
- The story so far
Janus Manager

Daily activity

Usage and structure
Janus Manager

- Management system for rehabilitation
- Stores client info
- A tool for
  - Administration
  - Communication
  - Producing reports
  - Predicting outcomes
Janus Manager

- 40 Users
  - Specialists
  - Administrative staff
- 1000+ clients
  - 150 active
- The code
  - Python
  - 25,000+ LOC
  - 600+ functions
  - 300 Classes
  - Run as web service on Apache
Daily activity

- Users
  - Request data
  - Save data
- Janus Manager
  - Processes requests
  - Interacts with the database
  - Responds with output
Daily activity

- Procedures in place to catch exceptions and log:
  - Request
  - Input data
  - Type of exception
  - Location of exception

- Logs saved in file on server
Genetic Improvement

Nightly activity

- Filter
- Generate
- Repair
- Report
Nightly activity

When last user logs out

1. **Procedure 2.0**
   - Sorts and filters the day's exceptions
Nightly activity

When last user logs out

1. Procedure 2.0 started
   ○ Sorts and filters the day’s exceptions
2. **Procedure 3.0**
   ○ Emulates input data, type, size and structure.
   ○ Produces test cases
Nightly activity

When last user logs out

1. Procedure 2.0 started
   - Sorts and filters the day’s exceptions
2. Procedure 3.0
   - Emulates input data, type, size and structure.
   - Produces test cases
3. Procedure 4.0
   - Genetic Improvement
   - Parallel process on the server
   - Outputs report for developer
Improvement log

<table>
<thead>
<tr>
<th>Bug</th>
<th>Frequency</th>
<th>Location</th>
<th>Fixed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throws ValueError</td>
<td>3</td>
<td>JanusManager.insert.participant.personal.info</td>
<td>Fixed</td>
</tr>
<tr>
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<td>1</td>
<td>JanusManager.insert.participant.general_stats.info</td>
<td>Not fixed</td>
</tr>
<tr>
<td>Throws TypeError</td>
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<td>JanusManager.fetch.chat.comment</td>
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Failed Improvement Report

© Bug F21:00:10:09:2016 not fixed

This bug caused ValueError exception in the function JanusManager.insert_participant.general_stats.info on 1 occasion.

Inputs to functions were:
- "{'occupation':u', 'children_total':u', 'unemployment':u', 'marital_status':u'}"
- Program passed all previous test cases.
- 1 new test case was produce from input, id: G211
- Program does not pass additional test cases: Throws ValueError

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## Improvement log

### Bugs fixed

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Successful Improvement Report

© Bug F21:00:10:09:2016 fixed

This bug caused ValueError exception in the function JanusManager.insert_participant_personal_info on 3 occasions.

Inputs to functions were:
- "{'name':u'phone':43332008, 'home':u'Fagurbraut 10'}"
- "{'name':u'phone':43332008, 'home':u'Fagurbraut 10'}"
- "{'name':u'phone':43332008, 'home':u'Fagurbraut 10'}"

It was fixed with an edit list of size 2: ['replace.bool, u', u'not', u', 'copy.line, u'return None', u', 42, 31']

- Program passed all previous test cases after patch was applied.
- 1 new test case was produce from input, id:F132
- Program passes additional test cases
The story so far

It works!

Just a summary
The story so far

- Janus Manager was developed last March
- Since October 2016 has had GI running as a permanent service
- 22 Bugs reported
  - Variable name mixup - *current_date vs. current_time*
  - Range constants - For i in range(len(Var)+1):
  - And more ….
- 22 Bugs fixed
  - Whole process takes 20 minutes (on average)
  - Fix found within 10 generations
The story so far

● Janus Manager was developed last March
● Since October 2016 has had GI running as a permanent service
● 22 Bugs reported
  ○ Variable name mixup - current_date vs. current_time
  ○ Range constants - For i in range(len(Var)+1):
  ○ And more ....
● 22 Bugs fixed
  ○ Whole process takes 20 minutes (on average)
  ○ Fix found within 10 generations
Thank you