DAASE

CHORDS

Computational
Heuristics
Operational Research
Decision-Support

Janus Manager

the Self-Improving Software System

Sæmundur Ó. Haraldsson
John R. Woodward
Alexander I.E. Brownlee

50th Crest Open Workshop
Genetic Improvement

Overview

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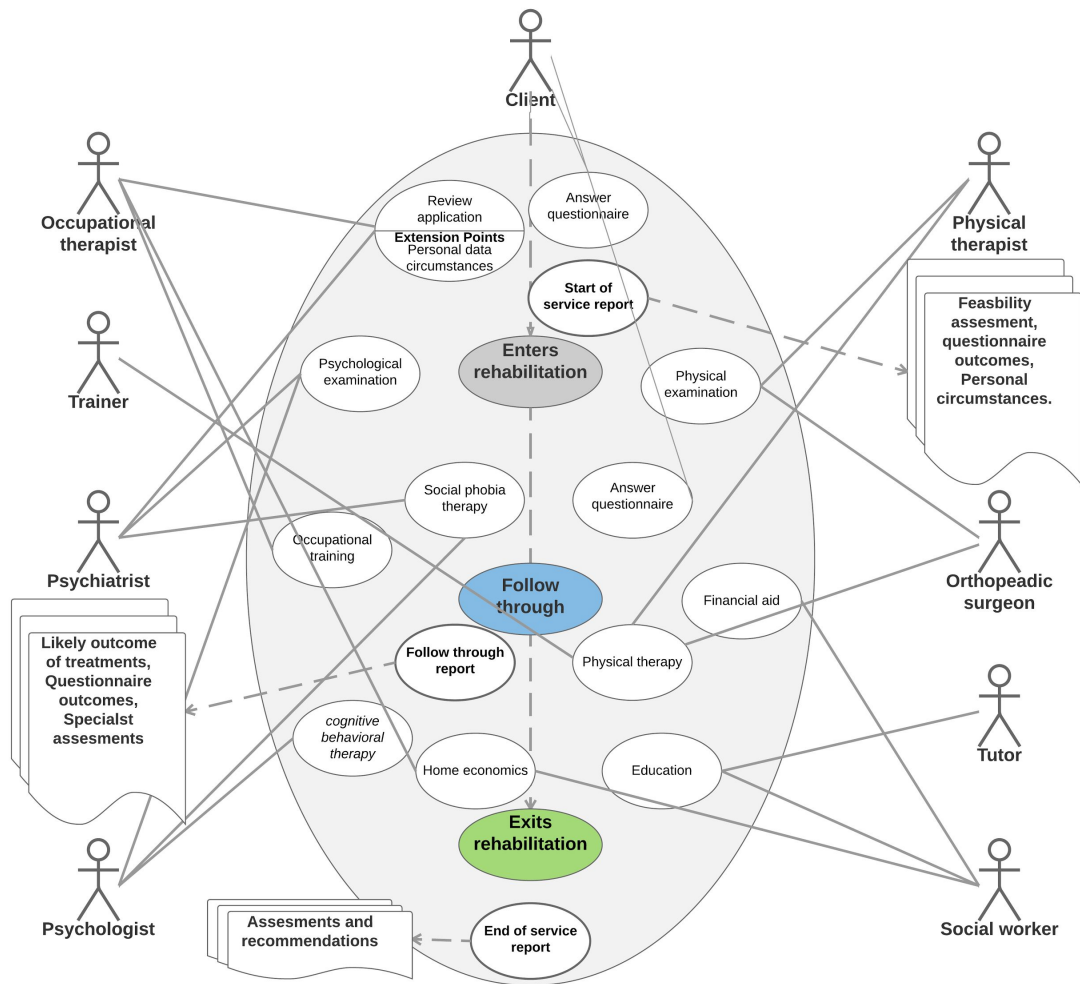- Genetic Improvement - Nightly activity
- The story so far

Janus Manager
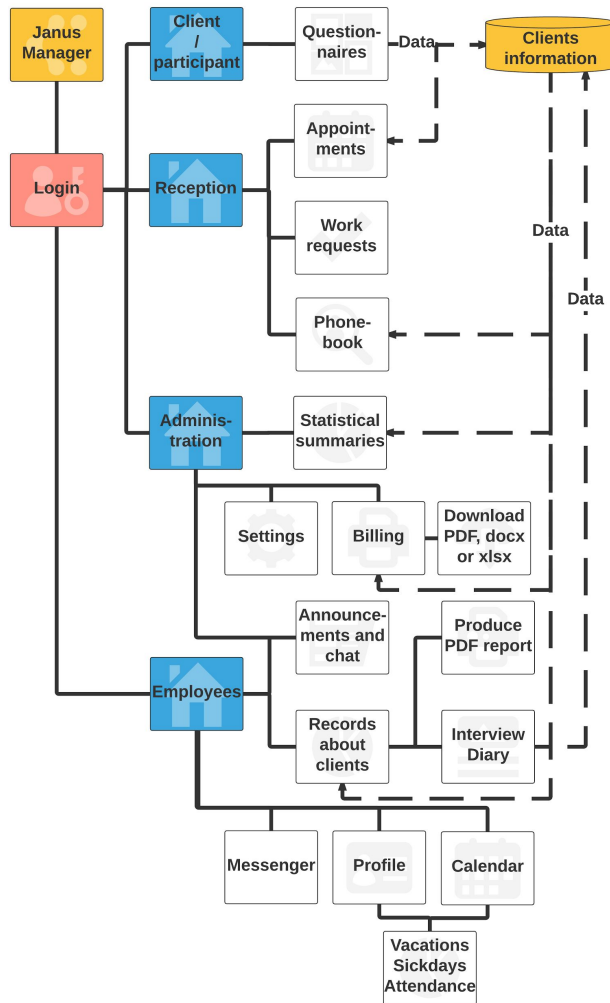
Daily activity

Usage and structure

Janus Manager

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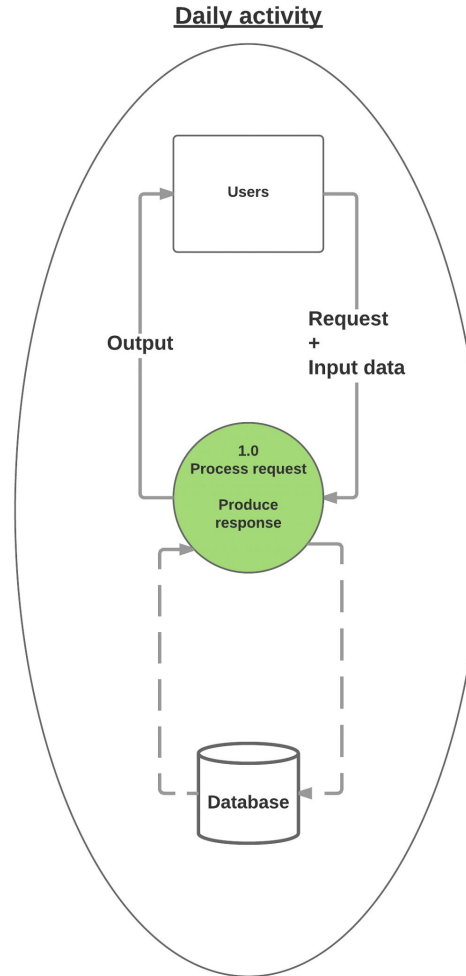 - Predicting outcomes

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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
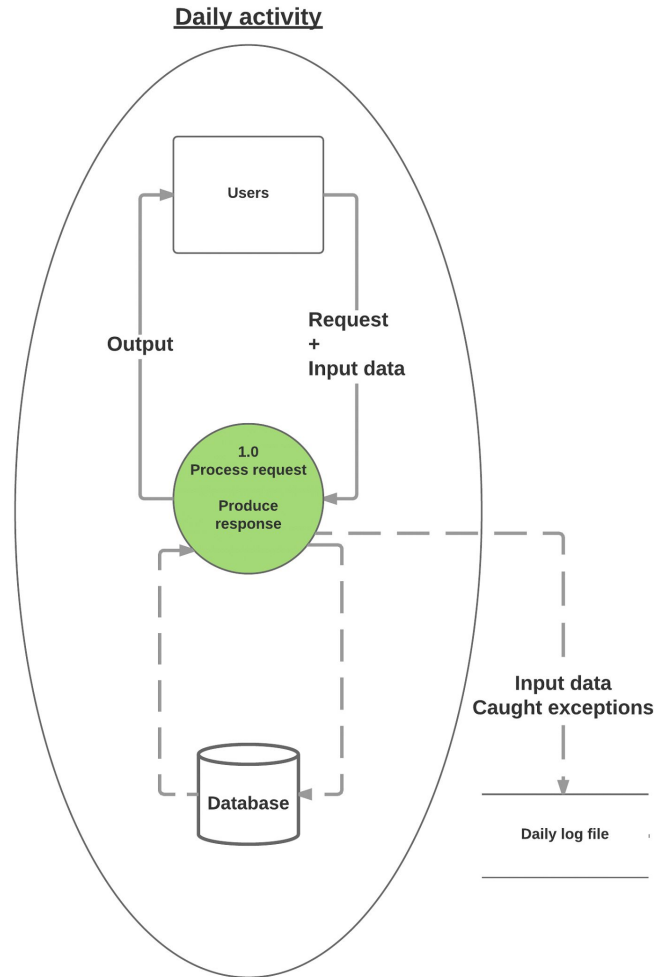
Daily activity

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

Users

Output

Request
+
Input data

1.0
Process request

Produce
response

Database

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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

Users

Output

Request + Input data

1.0 Process request

Produce response

Database

Input data Caught exceptions

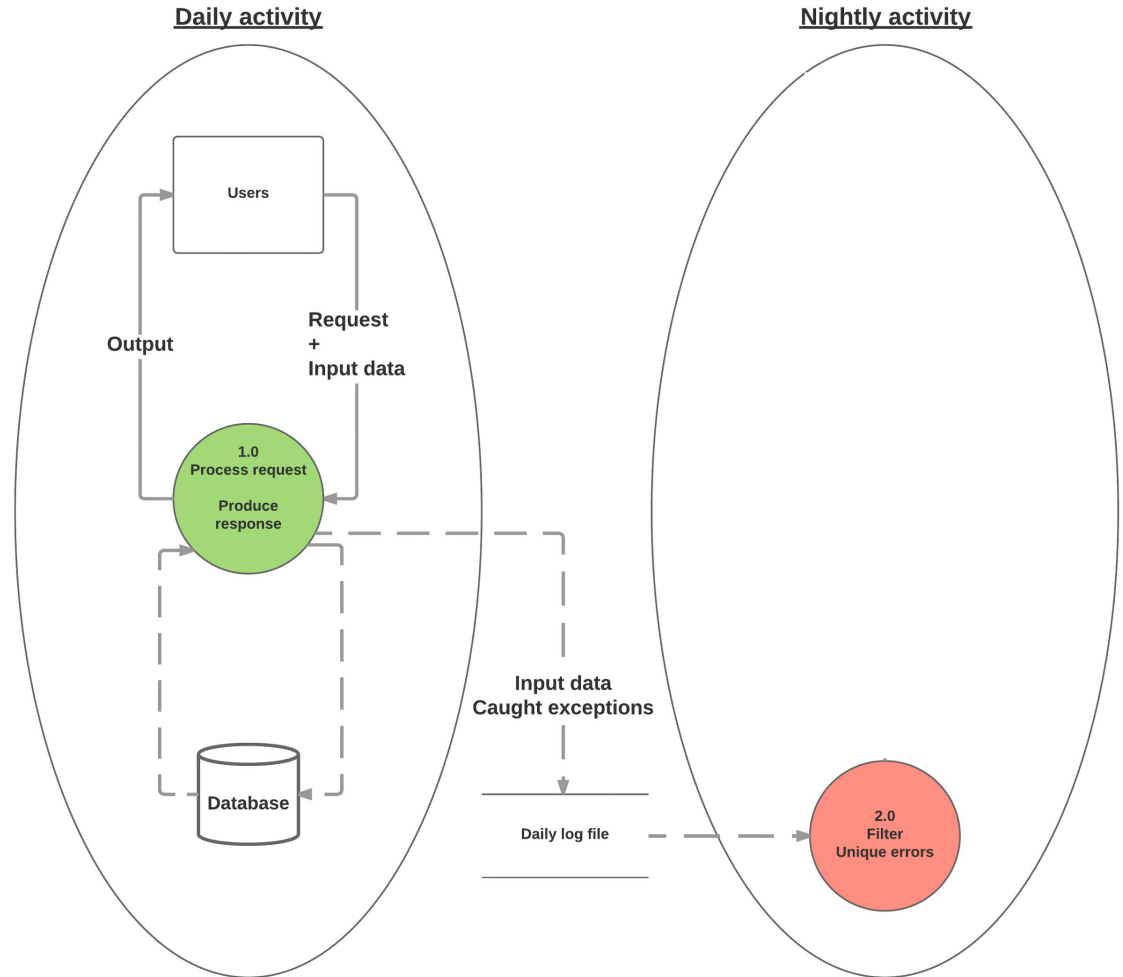**Daily log file**

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Genetic Improvement

Nightly activity

- Filter
- Generate
- Repair
- Report

Nightly activity

When last user logs out

1. Procedure 2.0
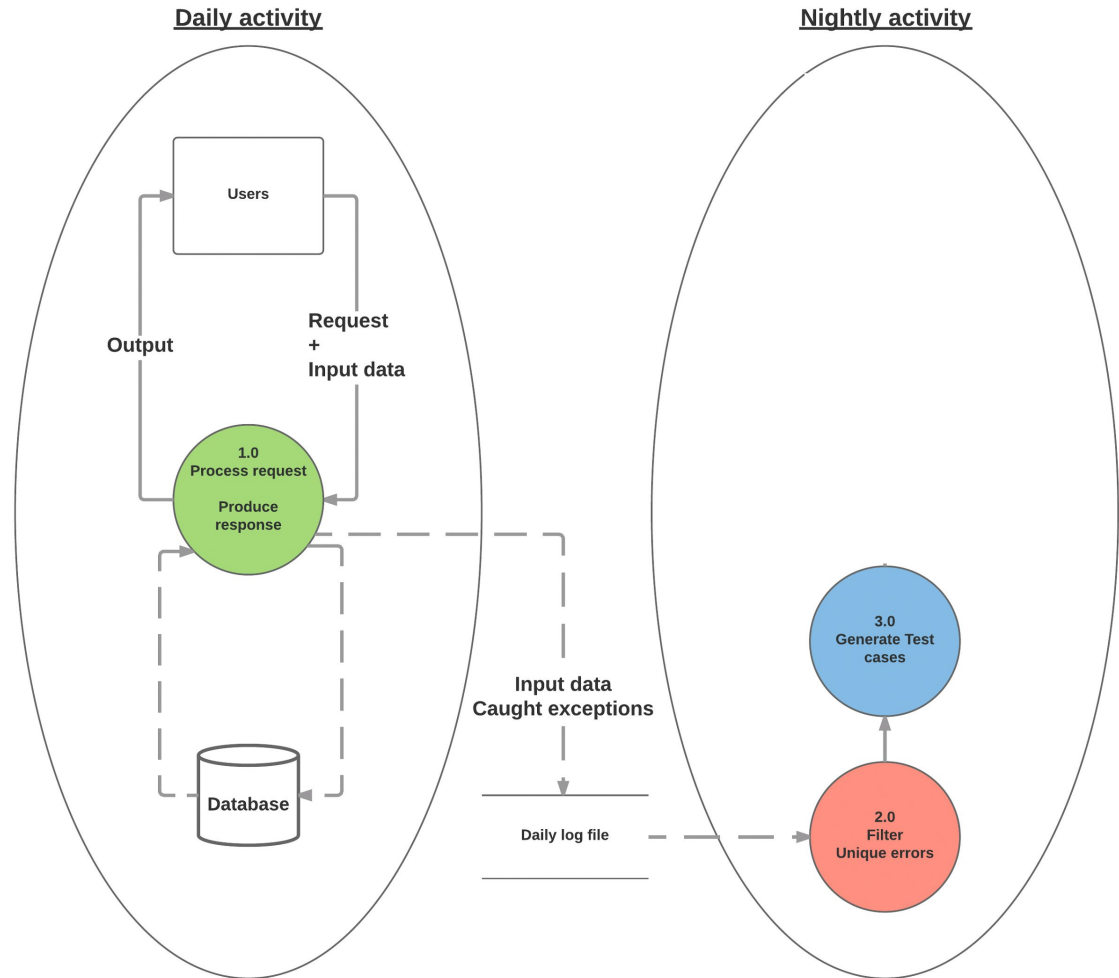   ○ Sorts and filters the day's exceptions

Daily activity

Users

Output

Request
+
Input data

1.0
Process request

Produce
response

Database

Input data
Caught exceptions

Daily log file

Nightly activity

2.0
Filter
Unique errors

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

Daily activity

Nightly activity

Users

Output

Request
+
Input data

1.0
Process request

Produce
response

Database

Input data
Caught exceptions

Daily log file

3.0
Generate Test
cases

2.0
Filter
Unique errors

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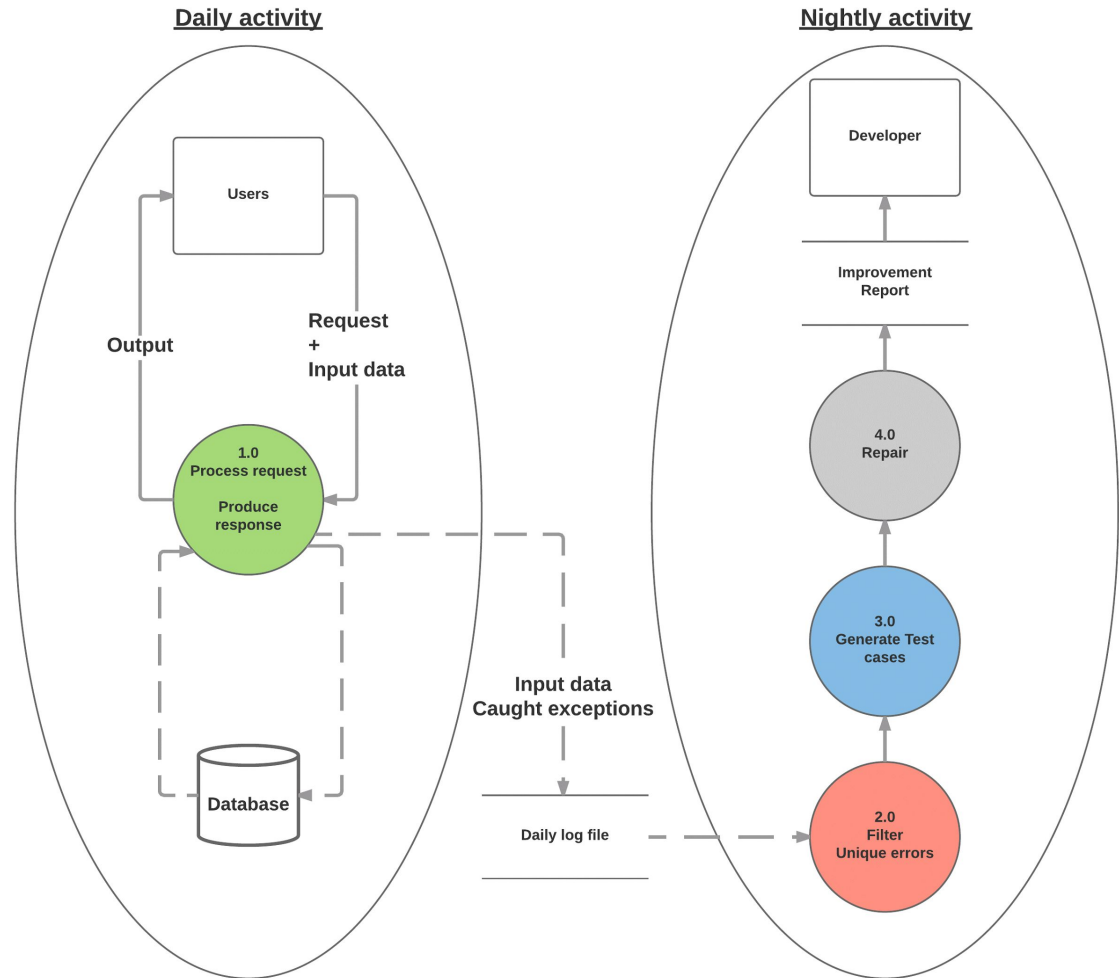# Nightly activity

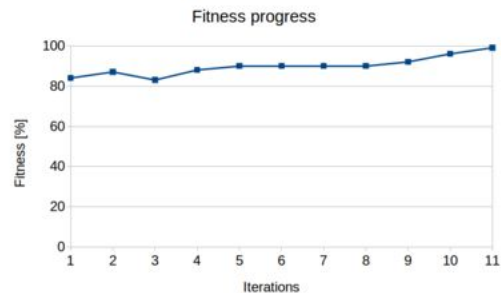When last user logs out

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

© Bugs fixed Started 21:00 on 10 September 2016, finished 21:14 on 10 September 2016

Bug	Frequency	Location	Fixed?
Throws ValueError	3	JanusManager.insert.participant.personal.info	Fixed
Throws ValueError	1	JanusManager.insert.participant.general_stats.info	Not fixed
Throws TypeError	1	JanusManager.fetch.chat.comment	Fixed

Fitness progress

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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.
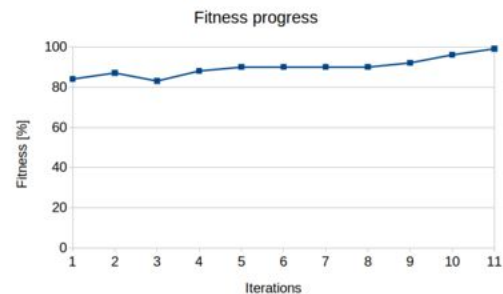
Inputs to functions were:

- "{'occupacion':u'','children_total':'','unemployement':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

Improvement log

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Bug	Frequency	Location	Fixed?
Throws ValueError	3	JanusManager.insert.participant.personal.info	Fixed
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Throws TypeError	1	JanusManager.fetch.chat.comment	Fixed

Fitness progress

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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,'','not',", "copy.line,"return None",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

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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

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Thank you