



# Test Automation without Assertions

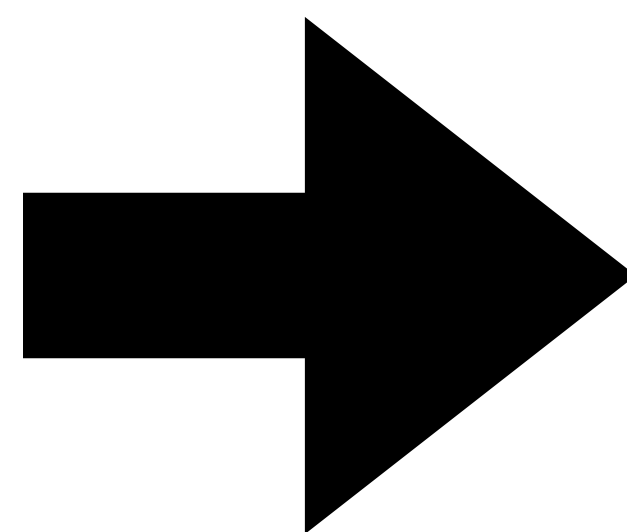
Dr. Jeremias Rößler (Roessler)

<https://retest.de>



# Please star us on GitHub!

Everyone who gives us a GitHub star, gets a sticker.





**expect(umbrellaOpens).toBe(true)**

**tests: 1 passed, 1 total**

**\*\*all tests passed\*\***

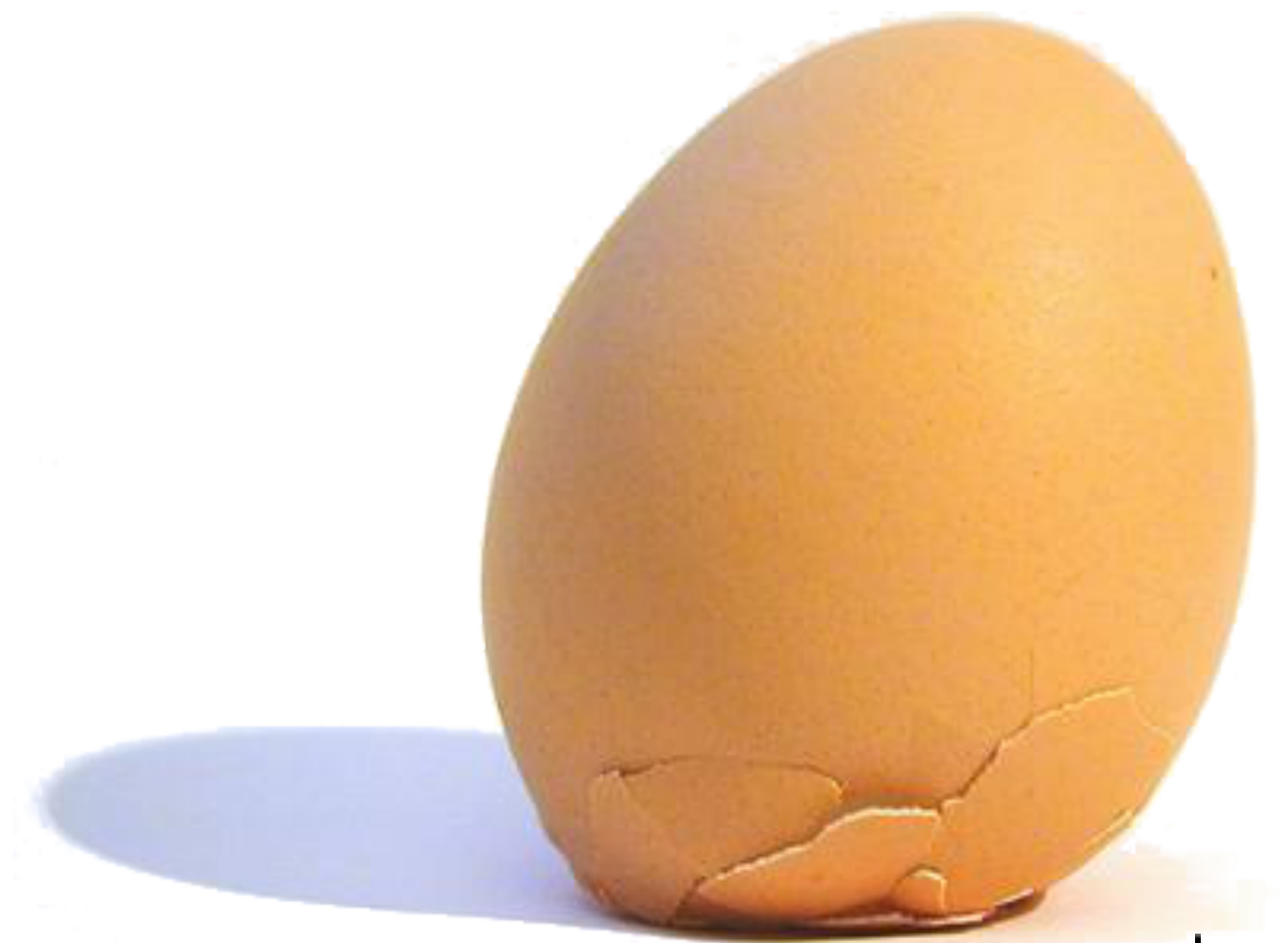




# Teaser-DEMO



We do one thing **different.**





You don't **define** the outcome,  
you **approve** it.

First you ensure that everything is **as wanted**.  
Then we make sure it doesn't **change**.



# automated tests

≠

# tests



**automated tests**

**=**

**version control**

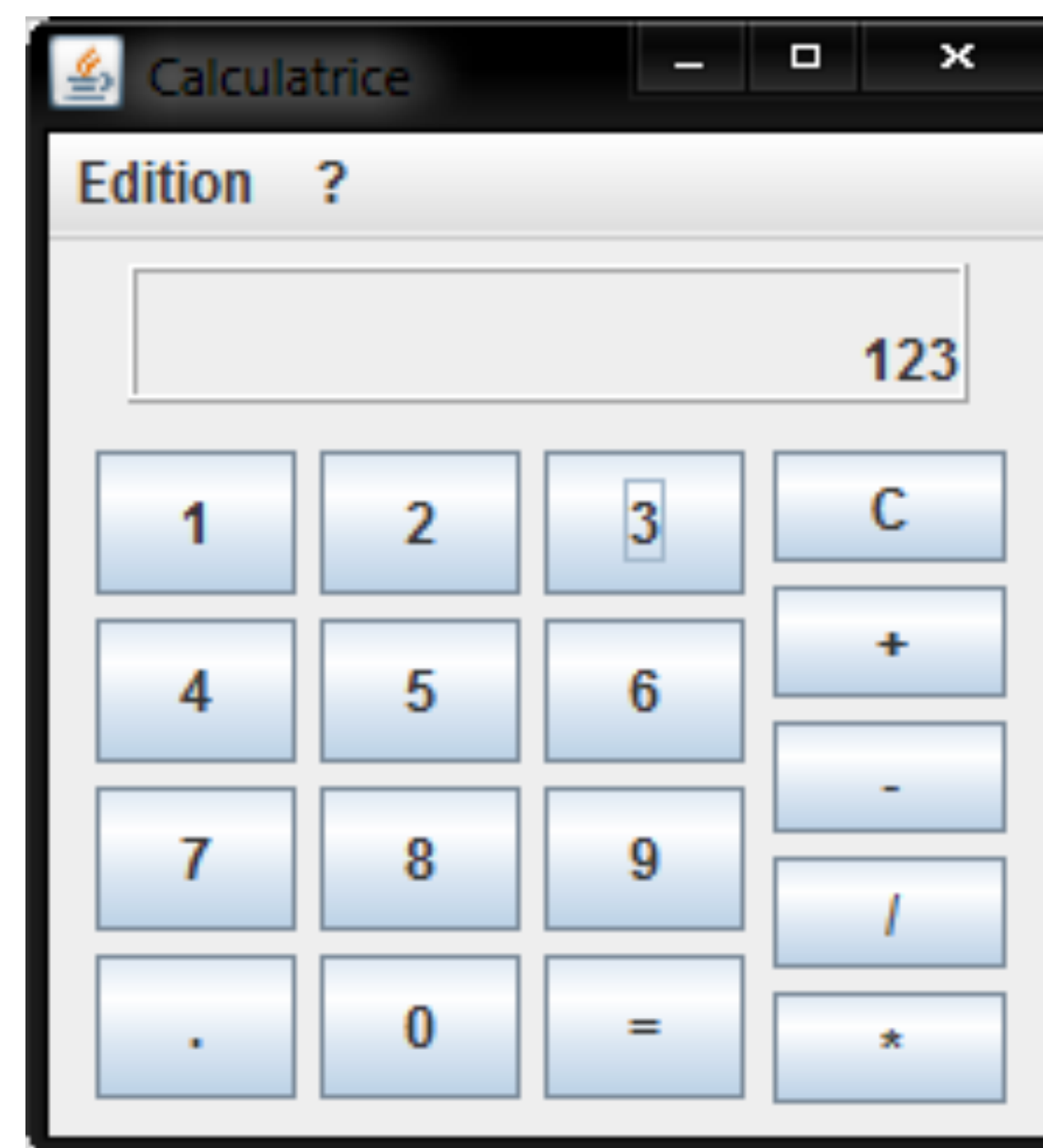
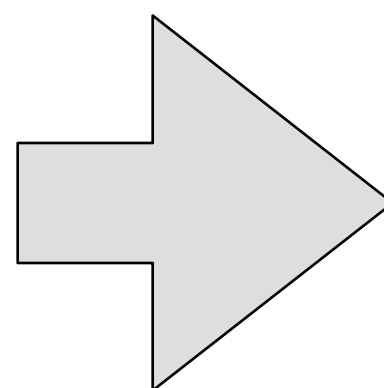




Where has the  
**Code** *changed?*



```
function date_mysql2ger($date) {  
    list($year, $month, $day) = explode("-", $date);  
    return sprintf("%02d.%02d.%04d", $day, $month, $year);  
}  
  
function date_ger2mysql($date) {  
    list($day, $month, $year) = explode("-", $date);  
    return sprintf("%04d-%02d-%02d", $year, $month, $day);  
}  
  
function timestamp_mysql2ger($t) {  
    return sprintf("%02d.%02d.%04d",  
        substr($t, 6, 2),  
        substr($t, 4, 2),  
        substr($t, 0, 4));  
}  
  
function date_mysql2ger($date) {  
    list($year, $month, $day) = explode("-", $date);  
    return sprintf("%02d.%02d.%04d", $day, $month, $year);  
}
```





Where has the  
**\_Software\_** *changed?*



# Closing the gap: *automated* tests



**automated tests**

**=**

**version control**



Capitol

THE BEATLES  
HEY JUDE

1

C1-50442

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# Two Challenges:

1) **Noise**

2) **Redundancy**

**Naïve**





**automated tests**

**=**

**version control**



**Ignore-List**  
of changes

Ideal amount  
of checks

**Deny-List**  
of changes



```

*.log
*.class
target/*.

```


**.gitignore**


```


Assert.assertFalse( result.contains(
Assert.assertTrue( result.contains(


```




1 Multiple choice: 

100 characters remaining 

Randomize answer order for each respondent 

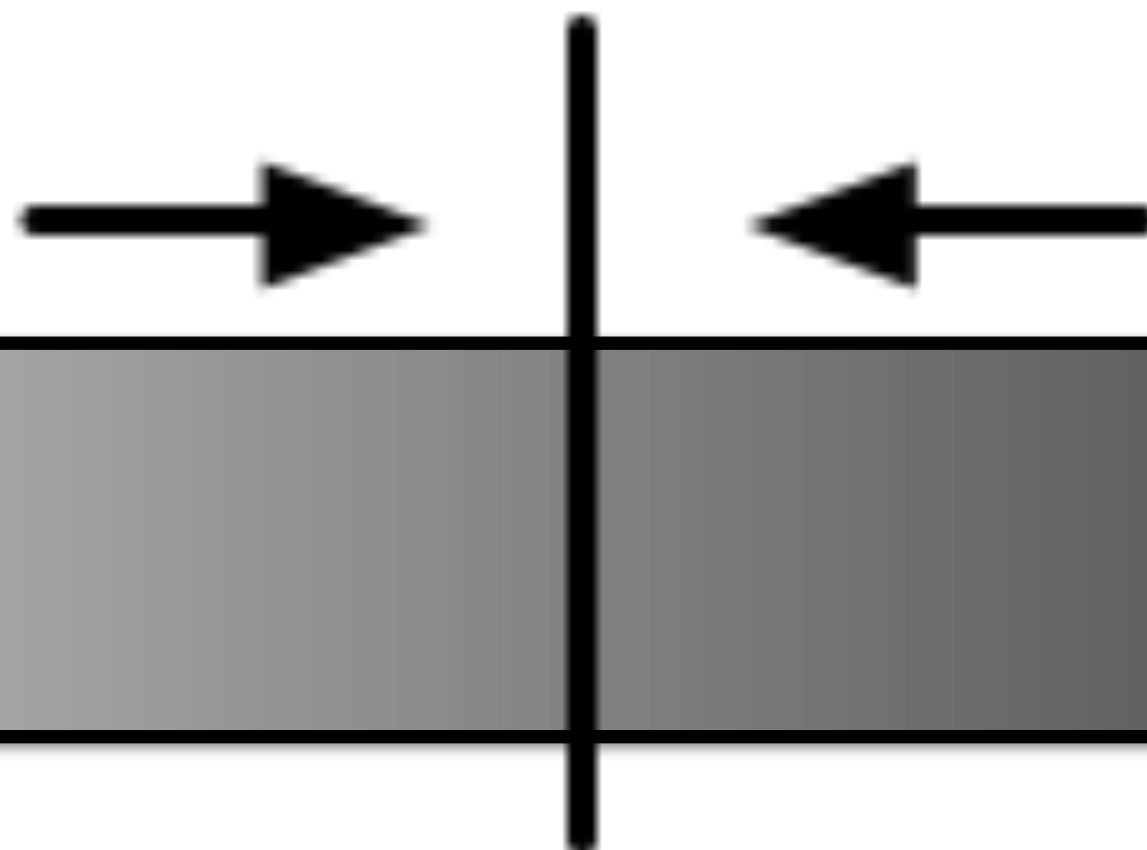
Randomize answer order for each respondent 

enter answer text



**Ignore-List**  
of changes

Ideal amount  
of checks



**Deny-List**  
of changes


check  
everything

check  
nothing





# Git for the GUI



```
# These files are ignored by git  
# based on their name:
```

```
*.log
```

```
*.class
```

```
target/*.*
```

# **.gitignore**



```
# Ignore file for recheck.
```

```
# Ignore attributes globally:  
attribute=class
```

**.retest/recheck.ignore**





```
# Ignore file for recheck.
```

```
# Ignore attributes with regex:  
attribute-regex=.*
```

**.retest/recheck.ignore**



```
# Ignore file for recheck.
```

```
# Ignore elements by tag:  
matcher: type=iframe
```

**.retest/recheck.ignore**



```
# Ignore file for recheck.
```

```
# Ignore elements by attribute:  
matcher: id=banner
```

**.retest/recheck.ignore**



```
# Ignore file for recheck.
```

```
# These can be combined:
```

```
matcher: id=ad, attribute-regex=font.*
```

# **.retest/recheck.ignore**



```
# Ignore file for recheck.
```

```
# Ignore whole subtrees:
```

```
matcher: xpath=HTML[1]/BODY[1]/DIV[1]/DIV[1]/DIV[1]
```

**.retest/recheck.ignore**



**ignore  $\approx$  filter**

# Better than pixel diffing

## Personal Budget

### Percentage of Income Spent



### Summary

TOTAL MONTHLY INCOME

\$3.750

TOTAL MONTHLY EXPENSES

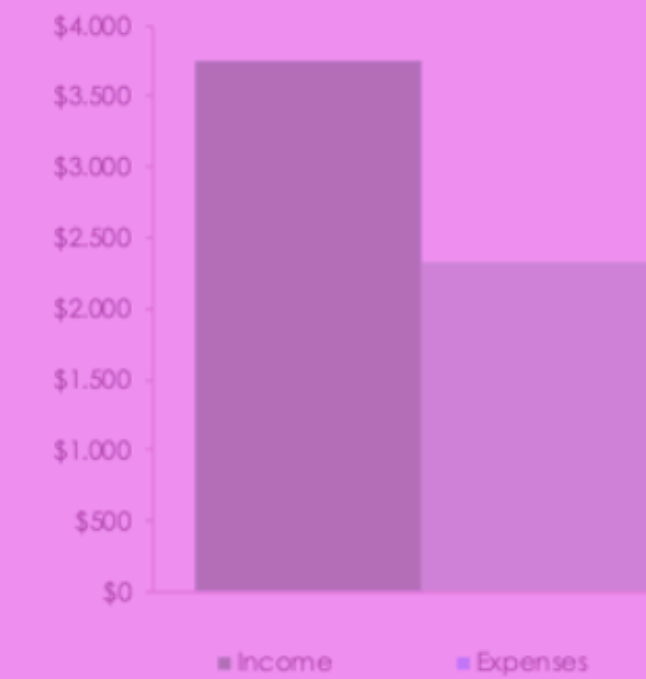
\$2.336

TOTAL MONTHLY SAVINGS

\$550

CASH BALANCE

\$864



### Monthly Income

ITEM	AMOUNT
Income Source 1	\$2.500,00
Income Source 2	\$1.000,00
Other	\$250,00

### Monthly Expenses

ITEM	DUE DATE	AMOUNT
Rent/mortgage	[Date]	\$800,00
Electric	[Date]	\$120,00
Gas	[Date]	\$50,00
Cell phone	[Date]	\$50,00
Groceries	[Date]	\$500,00
Car payment	[Date]	\$273,00
Auto expenses	[Date]	\$115,00
Student loans	[Date]	\$50,00

### Monthly Savings

DATE	AMOUNT
[Date]	\$200,00
[Date]	\$250,00
[Date]	\$100,00



# Demo



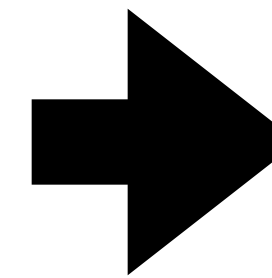
# Better than pixel diffing

**Difference in a state**  
Path: Budget[1]  
Content: Budget

**Expected**

**Actual**

UI element / Attribute	Expected value	Actual value	<input type="checkbox"/> Accept all	<input type="checkbox"/> Ignore all
▼ html				
outline	height=1089	height=1088	<input type="checkbox"/>	<input type="checkbox"/>
▼ body				
class	xl70	xl73	<input type="checkbox"/>	<input type="checkbox"/>
background-color		rgb(209, 243, 226)	<input type="checkbox"/>	<input type="checkbox"/>
font-family		"Andale Mono", sans-...	<input type="checkbox"/>	<input type="checkbox"/>
▼ div				
id	OriginalBudget_4734	AdaptedBudget_24715	<input type="checkbox"/>	<input type="checkbox"/>



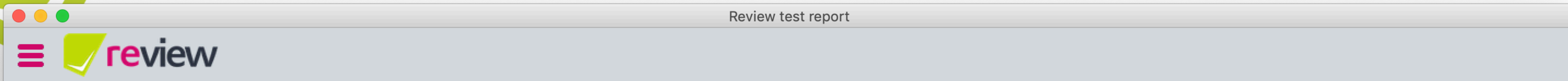
**Difference in a state**  
Path: Budget[1]  
Content: Budget

**Expected**

**Actual**

UI element / Attribute	Expected value	Actual value	<input type="checkbox"/> Accept all	<input type="checkbox"/> Ignore all
▼ td [\$120,00]				
text	\$120,00	\$115,00	<input type="checkbox"/>	<input type="checkbox"/>
td [ ]	td [ ]	missing	<input type="checkbox"/>	<input type="checkbox"/>
▼ img				
v:shapes	chtIncomeExpenses	chtIncomePct	<input type="checkbox"/>	<input type="checkbox"/>
▼ td [\$45,00]				
text	\$45,00	\$50,00	<input type="checkbox"/>	<input type="checkbox"/>

# Works with animations



## Hide the following differences:

- Positioning
- Style Attributes
- Invisible Attributes

Hide accepted/ignored differences

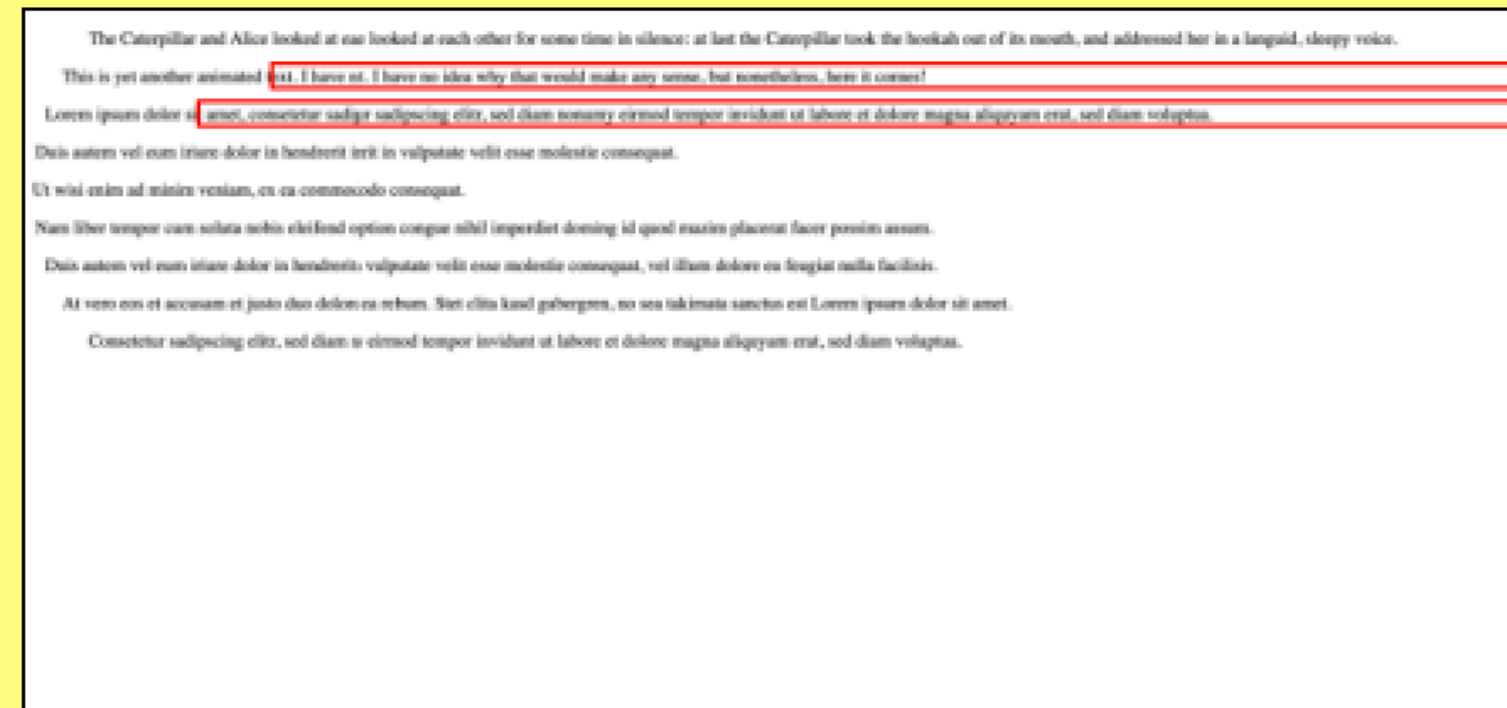
- ▼ Suite: Have multiple suites with rech...
- ▼ Test: Have multiple tests with rec...
- ▼ Diffing Animated Text
  - animation-d... animation-d...
  - style = anim... style = anim...
  - text = Lorem.. text = Lorem..

### Difference in a state

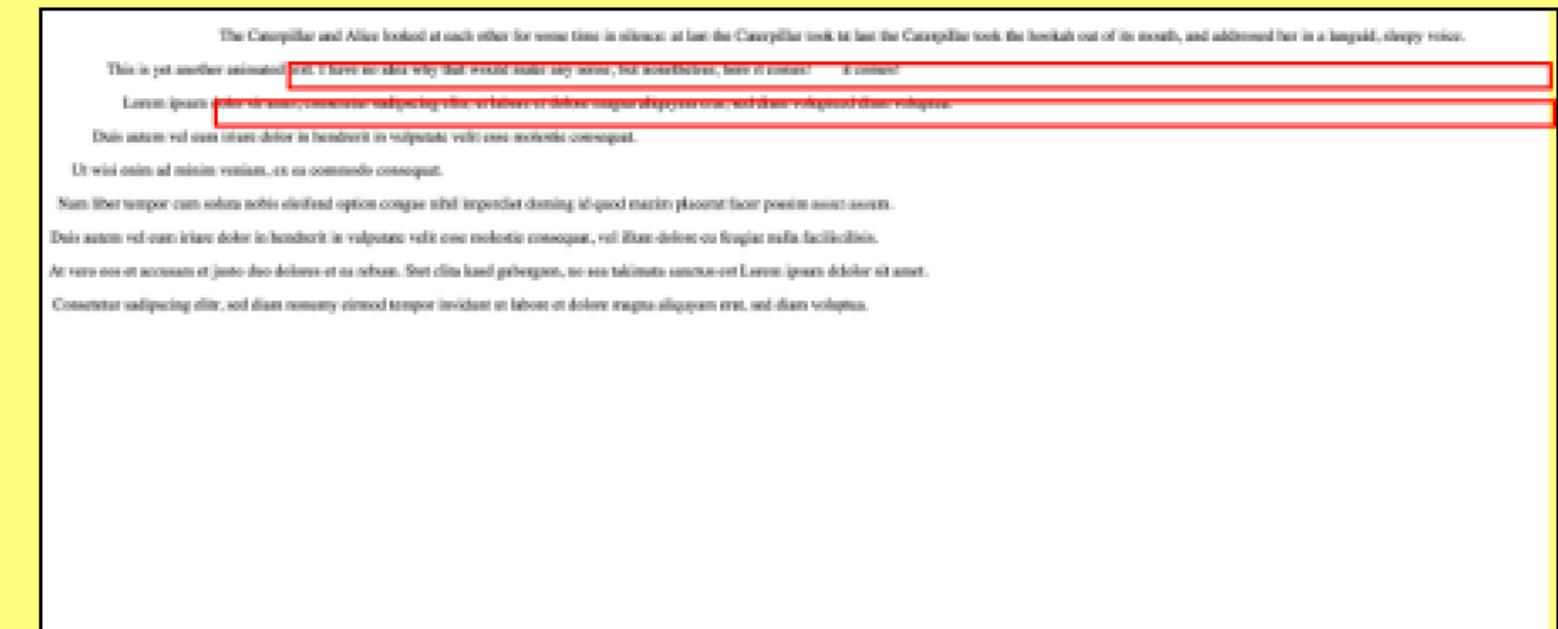
Path: Diffing Animated Text[1]

Content: Diffing Animated Text

#### Expected



#### Actual



UI element / Attribute	Expected value	Actual value
▼ p [This is yet another animated text. I have no idea ']		
animation-delay	0.2s	0.5s
style	animation-delay: 0.2s;	animation-delay: 0.5s;
▼ p [Lorem ipsum dolor sit amet, consetetur sadipscir text]		
text	...r sadipscing elitr, sed diam nonumy eirmod .....r sadipscing elitr, ut labore et dolore ...	



# Redundancy

# Tool Support



```
roessler — -bash — 61x8
Last login: Tue Oct 15 15:30:18 on ttys002
bonum:~ roessler$ recheck commit BudgetTest.report --all
```

# Tool Support



Review test report

≡
review

Test report: BudgetTest.report
Open...

**Hide the following differences:**

- Positioning
- Style Attributes
- Invisible Attributes
- Hide accepted/ignored differences

▼ Suite: de.retest.recheck.example.Bu...

▼ Test: java.util.Collections\$Empty...

▼ open

text = \$120,... text = \$115,...

deleted: td [ ]

src = Origina... src = Adapte...

text = \$45,00 text = \$50,00

src = Origina... src = Adapte...

inserted: col

**Golden Master**

**Actual**

**Path to Golden Master file:** src/test/resources/retest/recheck/de.retest.recheck.example.BudgetTest/excel.open.recheck

UI element / Attribute	Expected value	Actual value	<input type="checkbox"/> Accept all	<input type="checkbox"/> Ignore all
▼ td [\$120,00]				
text	\$120,00	\$115,00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
td [ ]	td [ ]	missing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
▼ img				
src	OriginalBudget.fld/Original...AdaptedBudget.fld/Ada...		<input type="checkbox"/>	<input checked="" type="checkbox"/>
▼ td [\$45,00]				
text	\$45,00	\$50,00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
▼ img				
src	OriginalBudget.fld/Original...AdaptedBudget.fld/Ada...		<input type="checkbox"/>	<input checked="" type="checkbox"/>
col	missing	col	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Apply changes

@Before

```
public void setup() {  
    driver = new ChromeDriver();  
}
```

@Test

```
public void check_formPage() throws Exception {  
    // To see differences, simply switch to formPage-changed.html below  
    String url = Paths.get("src/test/resources/formPage.html").toUri().toURL().toString();  
    driver.get(url);
```

```
    driver.findElement(By.id("email")).sendKeys("Emil");  
    driver.findElement(By.id("age")).sendKeys("16");  
    driver.findElement(By.name("login")).submit();
```

```
    Assert.assertEquals(driver.findElement(By.id("email")).getText(), "");  
}
```

@After

```
public void tearDown() throws InterruptedException {  
    driver.quit();  
}
```



```
findElement(by.id("sign-in"))
```

# new version

Username

Password

Log in

find in old version



ID changed

breaks

# old version

Username

Password

Sign in

# new version

Username

Password

Log in

use new element and log

create 1-on-1 assignment

best match



```
***** recheck warning *****
```

```
The HTML id attribute used for element identification changed  
from 'username' to 'asda'.
```

```
retest identified the element based on the persisted Golden  
Master.
```

```
If you apply these changes to the Golden Master , your test  
de.retest.recheck.example.MyUnbreakableSeleniumTest will  
break.
```

```
Use `By.id("asda")` or `By.retestId("username-1")` to update  
your test MyUnbreakableSeleniumTest.java:27.
```





### Golden Master

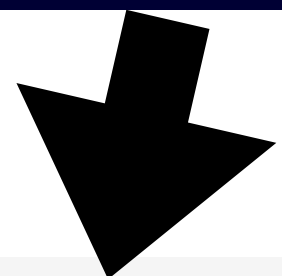
### Actual

Path: html[1]/body[1]/div[1]/div[1]/form[1]/div[1]/input[1]

UI element / Attribute	Expected value	Actual value	<input checked="" type="checkbox"/> Accept all	<input checked="" type="checkbox"/> Ignore all
id	username	asda	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Ignore element permanently

Apply changes



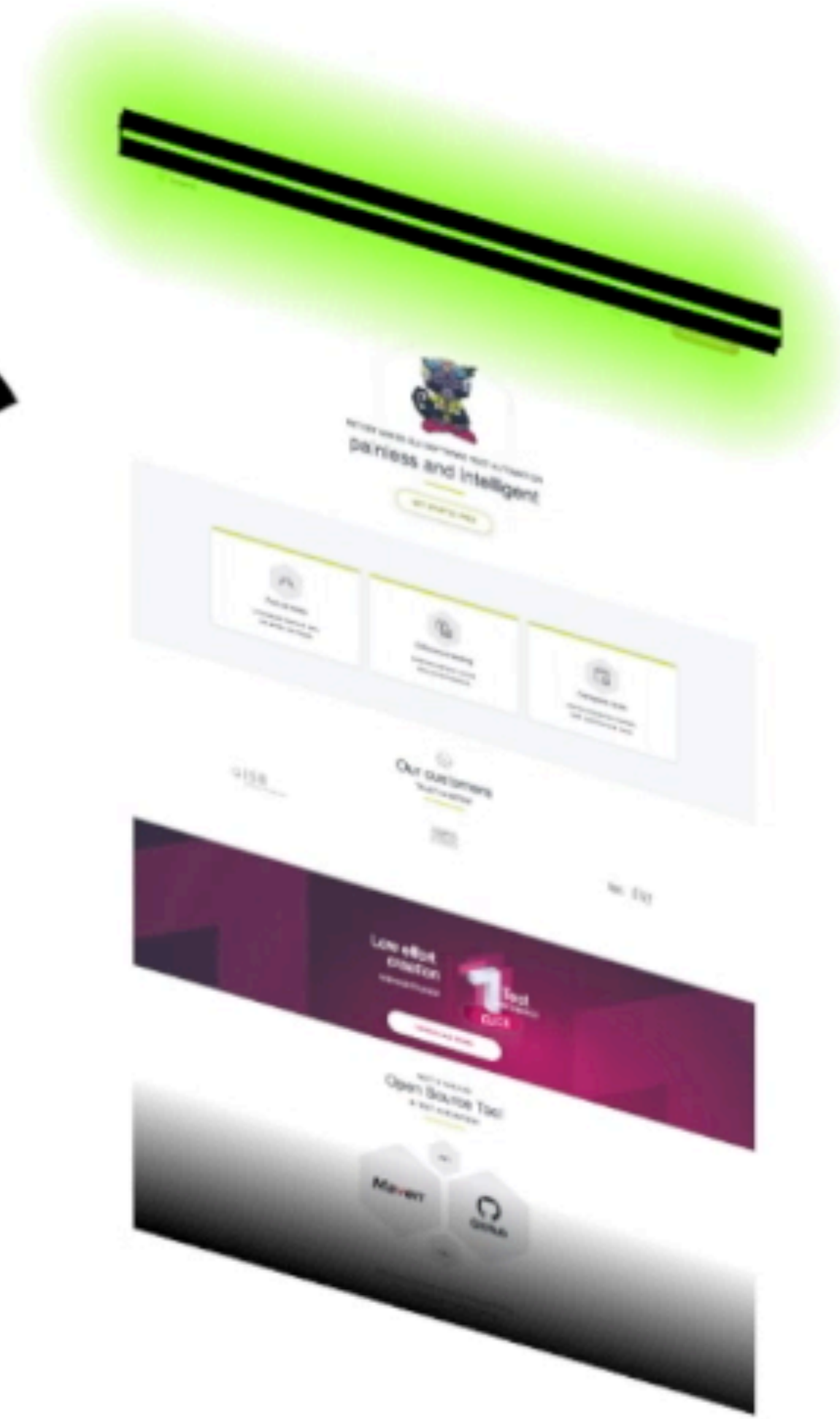
src/test/java/de/retest/recheck/example/MyUnbreakableSeleniumTest.java

Hunk 1 : Lines 27-29

```

27 27
28 - driver.findElement(By.id("username")).sendKeys("Simon");
28 + driver.findElement(By.id("asda")).sendKeys("Simon");
29 29 driver.findElement(By.id("password")).sendKeys("secret");

```





find in Golden Master

findByRetestId



return Element



best match


1-on-1 Assignment

Reason number 34986 why I hate selenium. People write code like this and are proud of it: result = self.driver.find\_element\_by\_css\_selector('#root > div > ul > li > div > p')

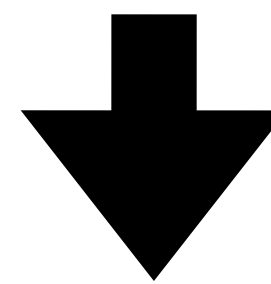


**Mr. Weasel** @alanpage

1:06am - 16 May 2019



```
<containedElements retestId="email">
  <identifyingAttributes>
    <attributes>
      <attribute key="absolute-outline" xsi:type="outlineAttribute">
        <x>8</x>
        <y>26</y>
        <height>19</height>
        <width>131</width>
      </attribute>
      <attribute key="id" xsi:type="stringAttribute">email</attribute>
      <attribute key="outline" xsi:type="outlineAttribute">
```



```
driver.findElement(By.retestId("email")).sendKeys("Emil");
driver.findElement(By.id("age")).sendKeys("16");
driver.findElement(By.name("login")).submit();
```



# data-independent tests



# recheck benefits:

- + **rule-based deterministic ignore**
- + **open source**
- + **offline usage**
- + **unbreakable selenium**
- + **works for *any* technical interface**



Michael Wowro

... I was thrilled by that product and new approach...

... let me congratulate you on your brilliant idea of the unbreakable Selenium and the web page difference checking solutions. I think this is a very much needed solution in the website testing field.



Ahmed Magdy



Karolina Wierbol

... the tool is very helpful, gives detailed information and is easy to use ...


some Feedback



<https://github.com/retest/recheck-web>



README.md

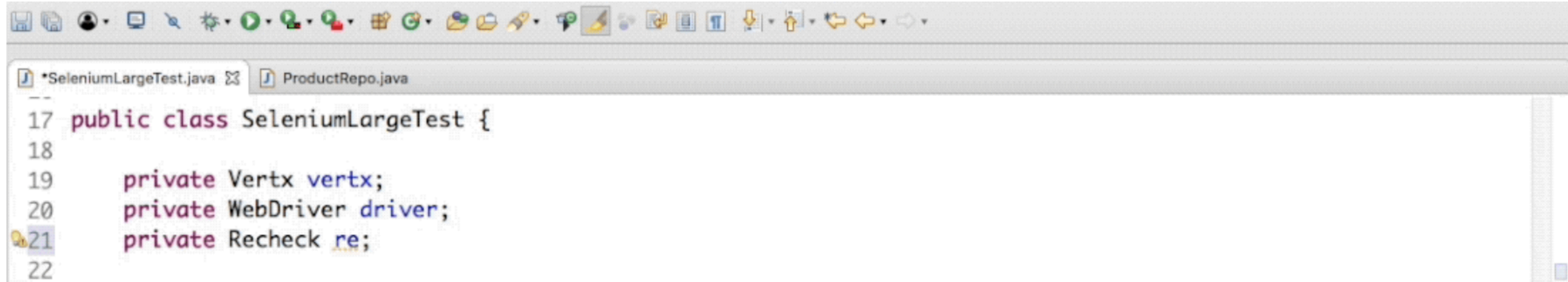


# recheck

for web apps

build **passing** maven central **0.6.2** license **AGPL** PRs **welcome** </> with ♥ by **retest**

**recheck** is a Golden Master-based test framework on top of Selenium that comes with powerful features. Check everything at once and create unbreakable tests.



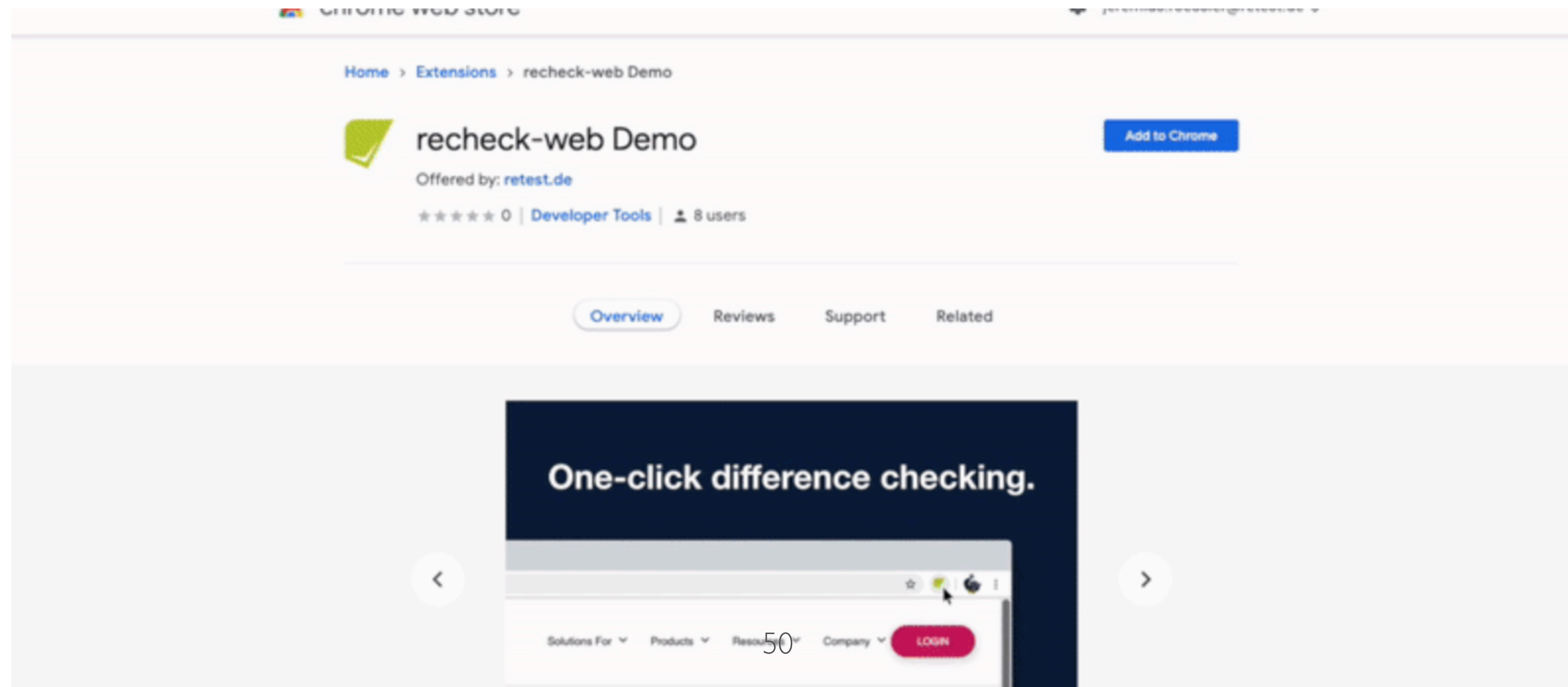
```
17 public class SeleniumLargeTest {
18
19     private Vertx vertx;
20     private WebDriver driver;
21     private Recheck re;
22
```

<https://github.com/retest/recheck-web-chrome-extension>

README.md

## recheck-web-chrome-extension

A Chrome extension that uses [recheck-web](#) to let you manually create 'checkpoints' of web sites. Using recheck-web together with the [recheck.cli](#) or the [review GUI](#), you can now easily find differences in websites. Using filters, you can easily differentiate between style, positioning or content differences—you can even define your own category!



# Our Business Model

Input

diff calculation  
+ storage

Output Reader

Open Source

recheck-web

```
24: @ParameterizedTest
25: @MethodSource("de.retest.web.testutils.BddDriverFactory@drivers")
26: void showcase_html_should_be_checked( final BddDriver driver ) throws Exception {
27:     this.driver = driver;
28:     re.startTest( "showcase-" + driver.getClass().getSimpleName() );
29:
30:     driver.get( Pagefactory.page( Page.SHOWCASE ) );
31:
32:     Thread.sleep( 1000 );
33:
34:     re.check( driver, "open" );
35:
36:     re.waitForTest();
37: }
```



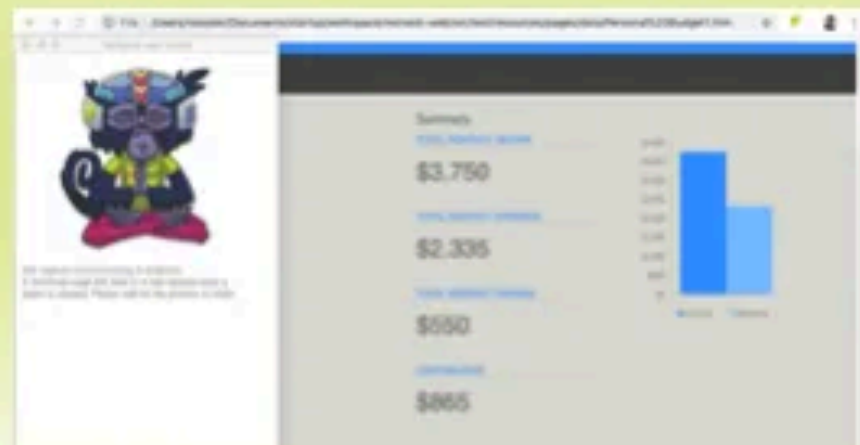
local

recheck.CLI

```
bonus@recheck-web-tutorial:roessler$ recheck
Usage: recheck [--help] [--version] [COMMAND]
Command-line interface for recheck.
--help      Display this help message.
--version   Display version info.

Commands:
version    Display version info.
diff       Display differences of given test report.
commit     Accept specified differences of given test report.
ignore     Ignore specified differences of given test report.
completion Generate and display an auto completion script.
help       Displays help information about the specified command
bonus@recheck-web-tutorial:roessler$
```

Chrome Extension



Proprietary



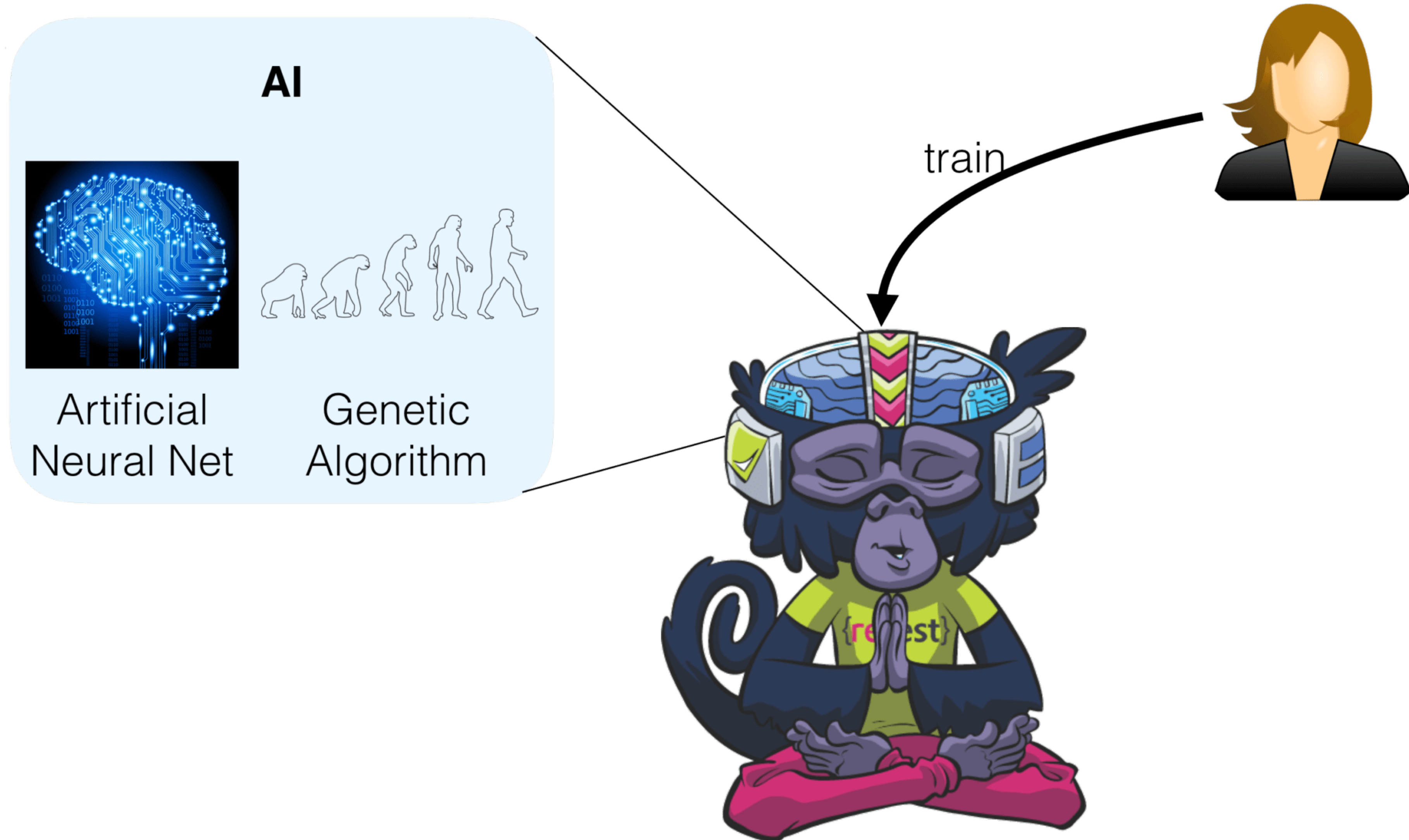
rehub cloud

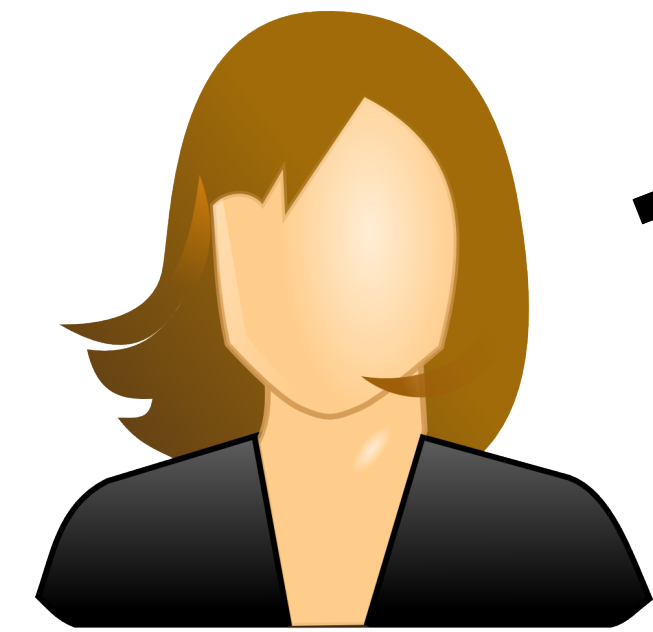
review GUI



+ AI

# AI-based Test Generation





user



approve

test

train

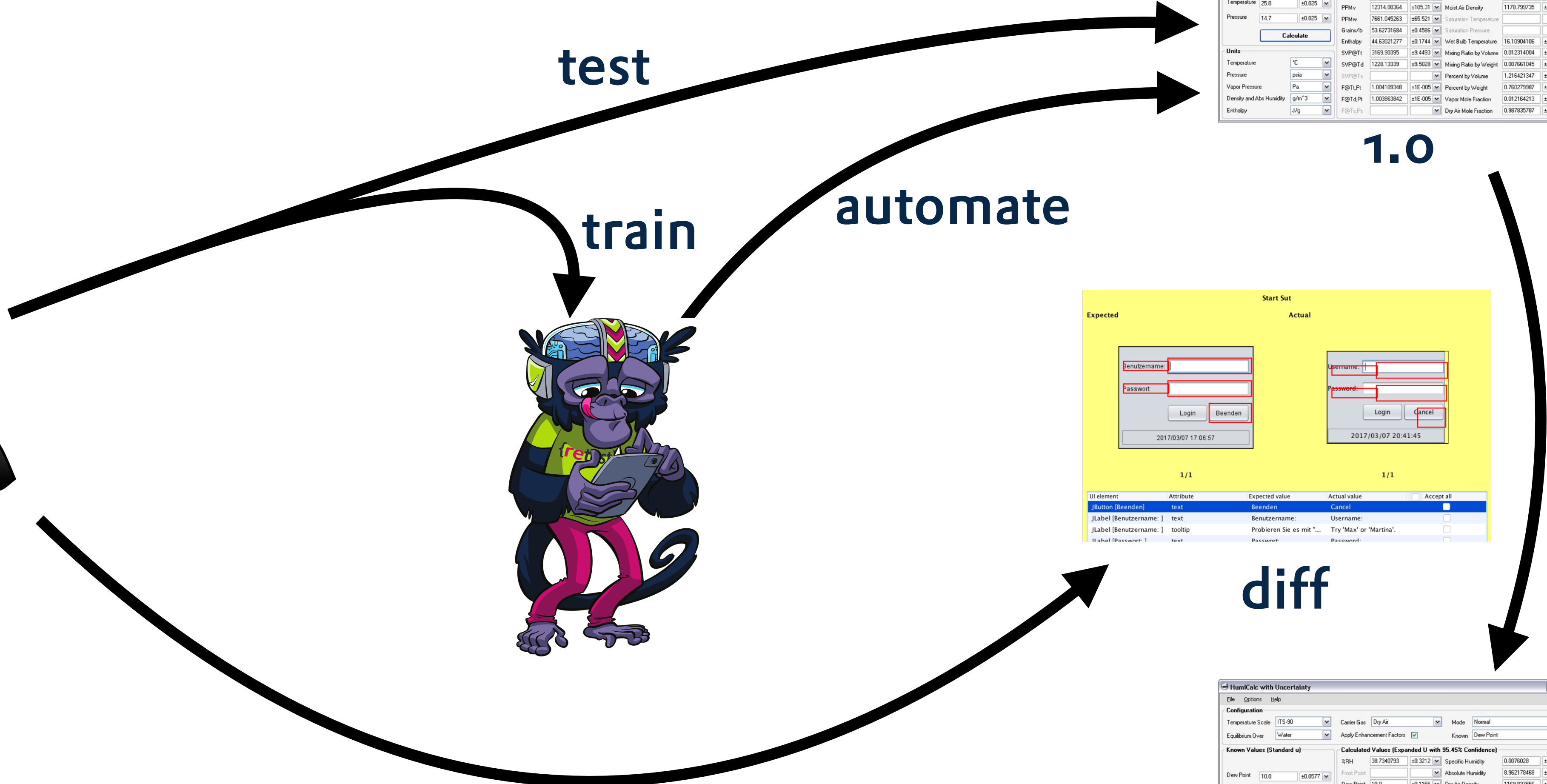
automate

1.0

UI element	Attribute	Expected value	Actual value	Accept all
J.Button [Beenden]	text	Beenden	Cancel	<input type="checkbox"/>
J.Label [Benutzername: ]	text	Benutzername:	Username:	<input type="checkbox"/>
J.Label [Benutzername: ]	tooltip	Probieren Sie es mit "... Try 'Max' or 'Martina'.		<input type="checkbox"/>
J.Label [Passwort: ]	text	Passwort:	Passwort:	<input type="checkbox"/>

diff

1.1



# Summary

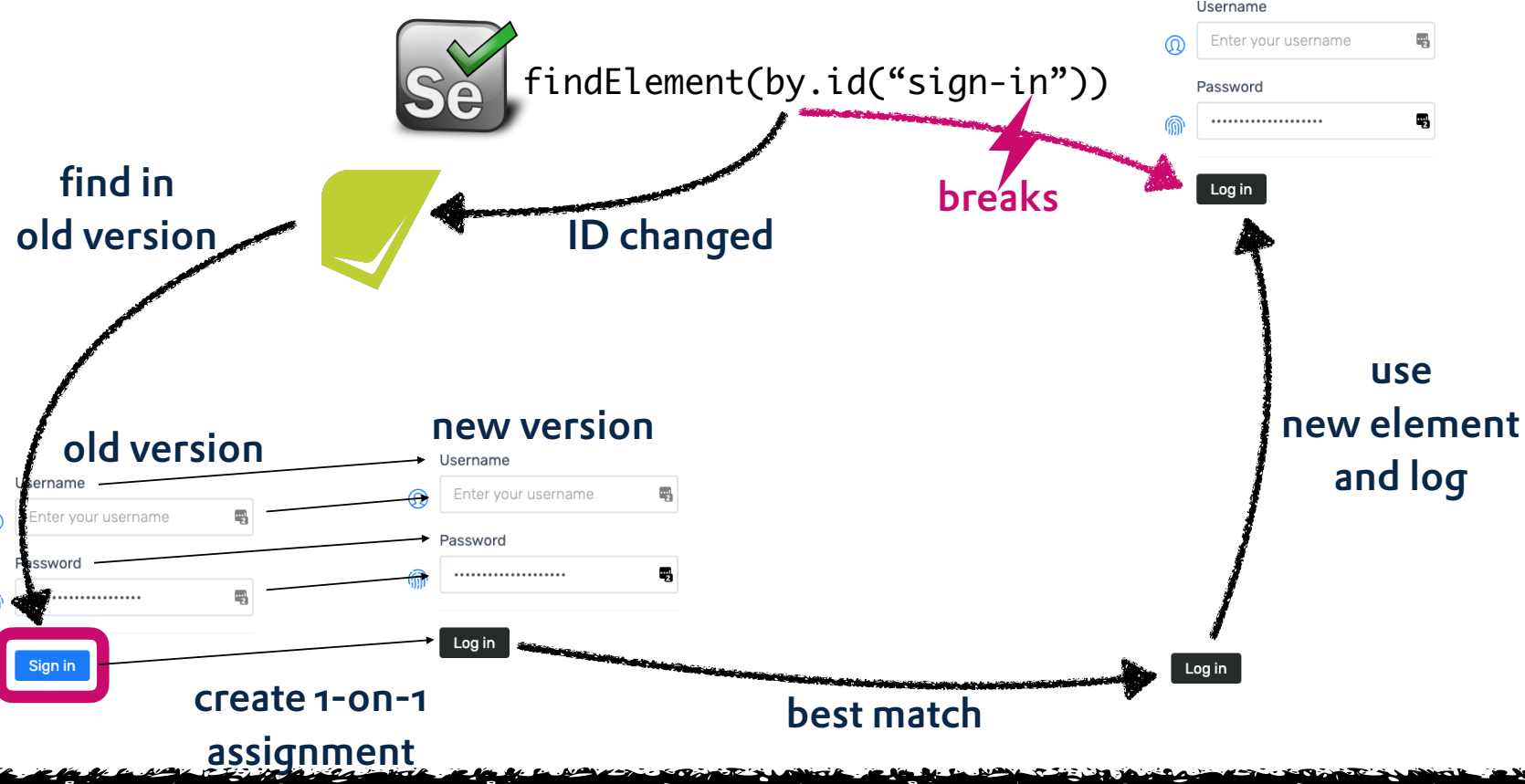


## Better than pixel diffing



Difference Testing  
whitelist testing  
easy creation  
easy maintenance

retest



Unbreakable Selenium:  
easy to use  
define own ids  
data-independent tests



# Please star us on GitHub!



@roesslerj



<https://www.facebook.com/retest.de>



[roessler@retest.de](mailto:roessler@retest.de)



<http://retest.rocks>



Sales Order - SO-000075 - Customer-01

Home Help CRM Ship To

New Save Undo Find Void Print Customer Detail Create Purchase Order Create Drop Ship Order Duplicate Sales Order Import Sales Quote Convert To Sales Invoice

Order Customer Payment Sales Rep History Audit Trail Attachments MaxMind Shipment List

Order Code: SO-000075, Order Date: 11/4/2011, Location: Main Warehouse, Customer PO: , Payment Term: Terms 30 Days from Document Date, Shipping Method: User Entered Delivery Charge, Currency: USD, Contact: Customer-01

Accounts Receivable: Accounts Receivable, Freight: Freight Income, Discount Given: Settlement Discounts Allowed, Other: Other Income

Inventory Overall Availability Commission Shipped Profit

Item Code	Quantity	Allocate	Reserved	UM	Description	Location	Type	Sales Price	Net Price	Ext Price
Test Item 01	1.00	1.00	0.00	EACH	Test Item 01	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 02	1.00	1.00	0.00	EACH	Test Item 02	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 01	1.00	1.00	0.00	EACH	Test Item 01	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 02	1.00	1.00	0.00	EACH	Test Item 02	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61

Addresses: Bill To: Customer-01, Ship To: Customer-01

Summary: Sub Total, Freight, Other, Sales Tax

MacBook Pro





**ORACLE**

**PROBLEM**



```
roessler — -bash — 64x7
Last login: Wed Mar 13 14:54:50 on ttys002
bonum:~ roessler$ Does God exist?
```



Sales Order - SO-000075 - Customer-01

Home Help CRM Ship To

New Save Undo Find Void Print Customer Detail Create Purchase Order Create Drop Ship Order Duplicate Sales Order Import Sales Quote Convert To Sales Invoice

Order Customer Payment Sales Rep History Audit Trail Attachments MaxMind Shipment List

Order Code: SO-000075, Order Date: 11/4/2011, Location: Main Warehouse, Customer PO: , Payment Term: Terms 30 Days from Document Date, Shipping Method: User Entered Delivery Charge, Currency: USD, Contact: Customer-01

Accounts Receivable: Accounts Receivable, Freight: Freight Income, Discount Given: Settlement Discounts Allowed, Other: Other Income

Inventory Overall Availability Commission Shipped Profit

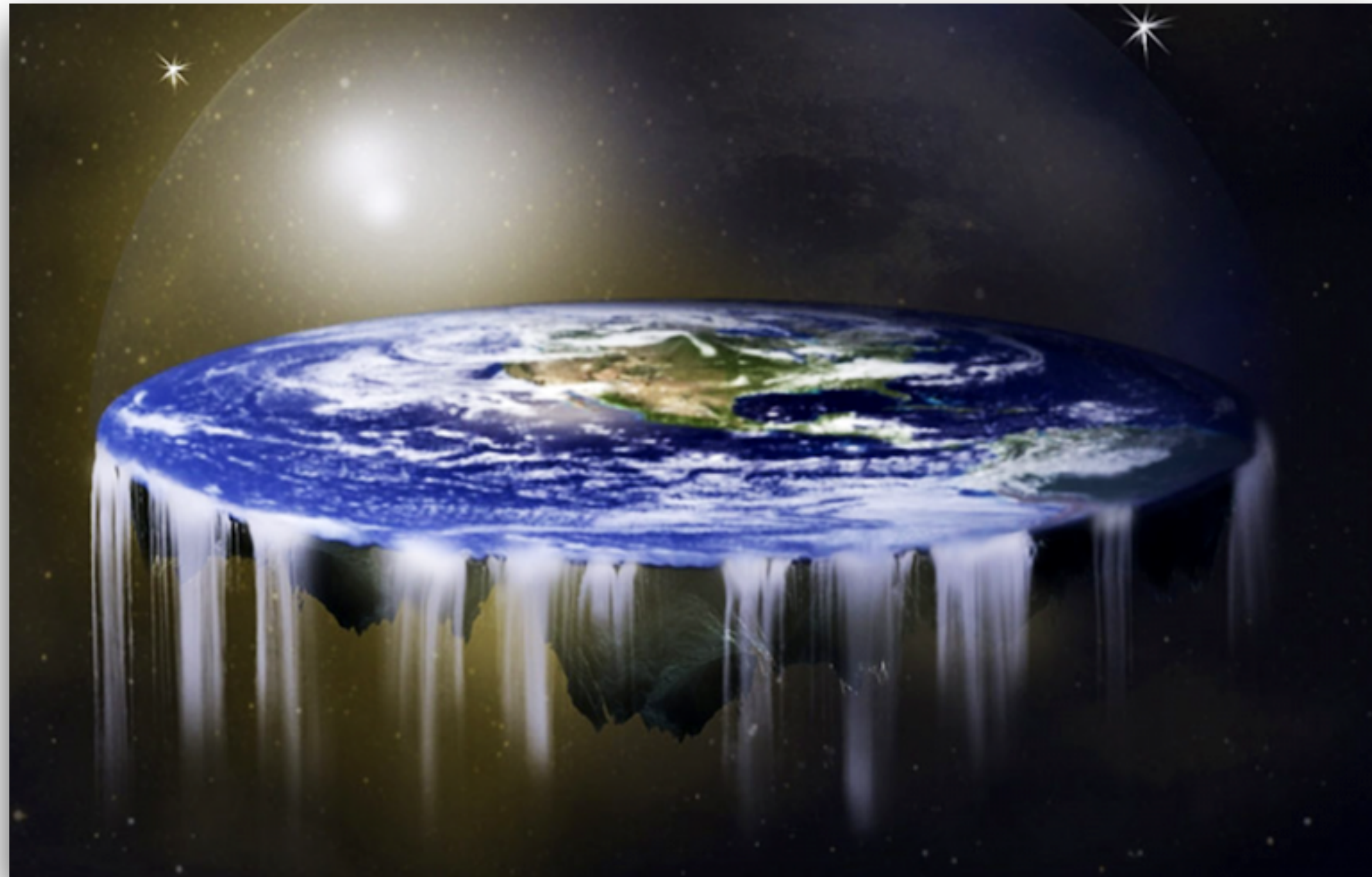
Item Code	Quantity	Allocate	Reserved	UM	Description	Location	Type	Sales Price	Net Price	Ext Price
Test Item 01	1.00	1.00	0.00	EACH	Test Item 01	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 02	1.00	1.00	0.00	EACH	Test Item 02	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 01	1.00	1.00	0.00	EACH	Test Item 01	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 02	1.00	1.00	0.00	EACH	Test Item 02	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61

Addresses: Bill To: Customer-01, Ship To: Customer-01

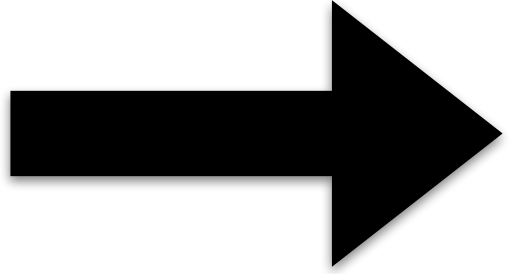
Summary: Sub Total, Freight, Other, Sales Tax

MacBook Pro

# ORACLE PROBLEM



# ORACLE PROBLEM

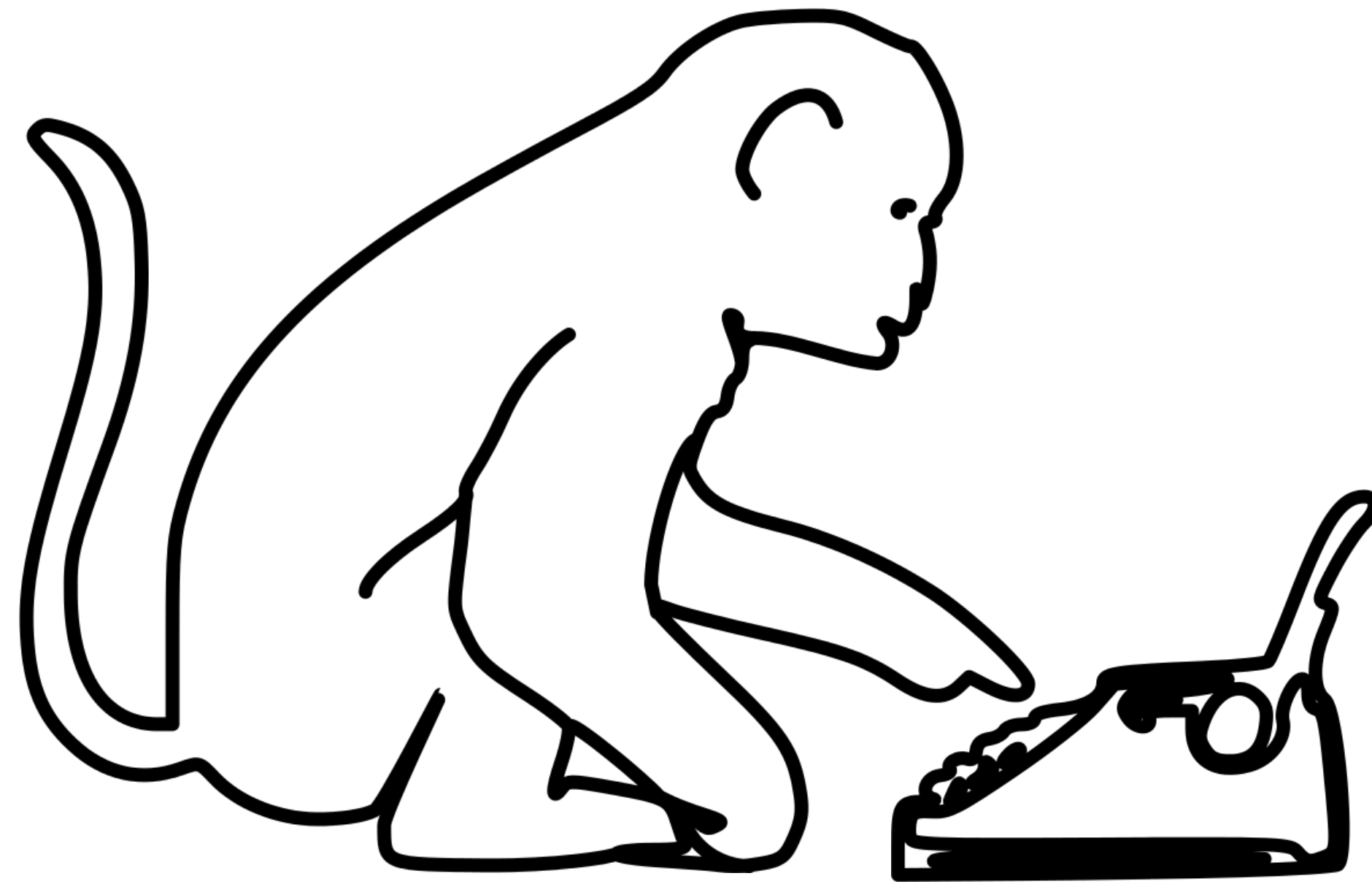




How do you bring **AI** test automation?  
into ~~testing~~?



Infinite-Monkey-Theorem:  
A monkey hitting keys at random on a typewriter  
for a long enough time  
will type the complete works of William Shakespeare.





We replace the typewriter with a computer...







```
1. public static void main(String... args) throws Exception {
2.     Robot robot = new Robot();
3.     while (true) {
4.         robot.mouseMove(random.nextInt(maxX), random.nextInt(maxY));
5.         robot.mousePress(InputEvent.BUTTON1_DOWN_MASK);
6.         robot.mouseRelease(InputEvent.BUTTON1_DOWN_MASK);
7.         robot.delay(200);
8.         for (char inputChar : randomString().toCharArray()) {
9.             robot.keyPress((int) inputChar);
10.            robot.keyRelease((int) inputChar);
11.            robot.delay(10);
12.        }
13.        robot.keyPress(KeyEvent.VK_ENTER);
14.        robot.keyRelease(KeyEvent.VK_ENTER);
15.    }
16. }
```



DEMO

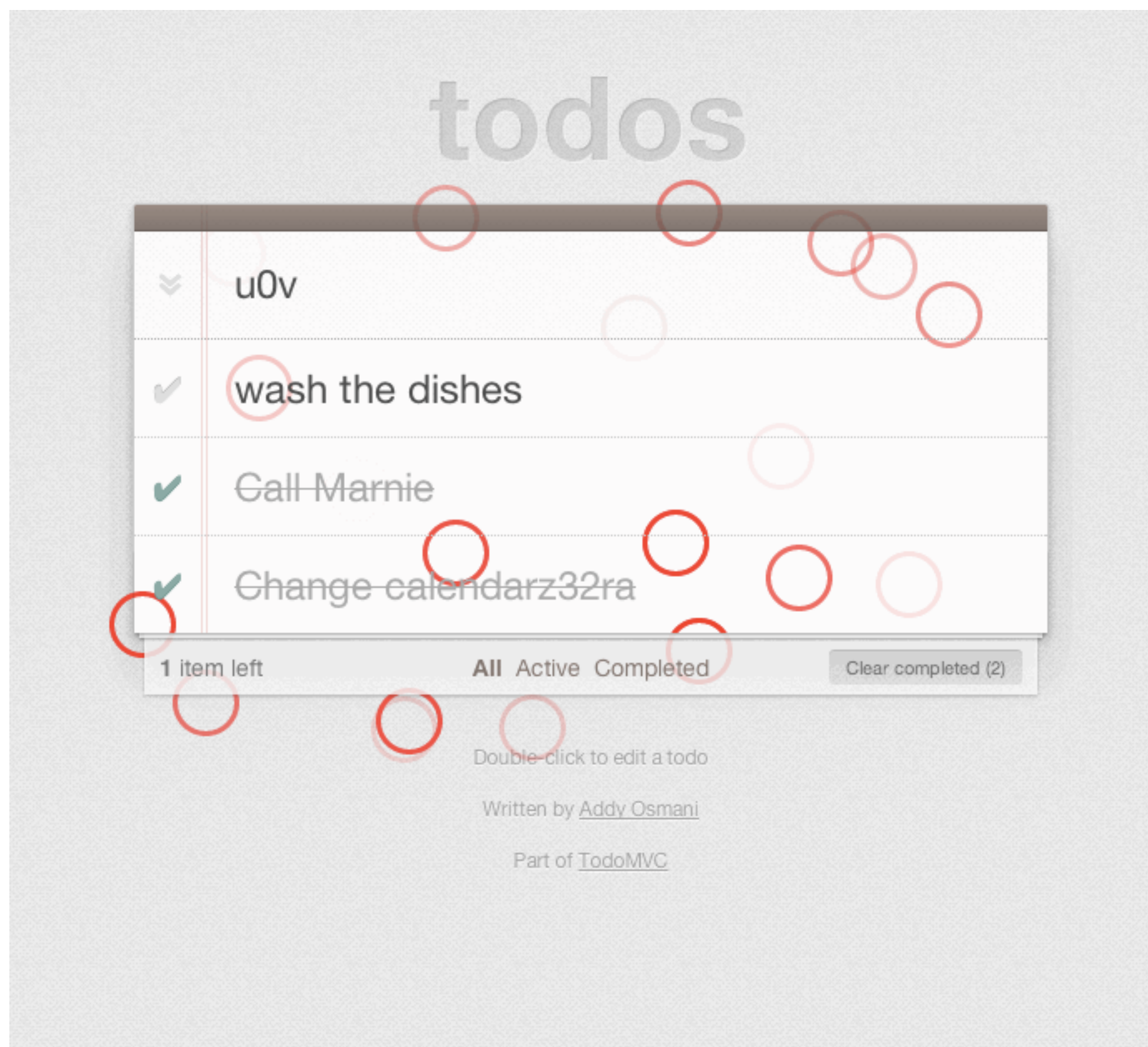
# Vollautomatisches Regressionstesten.

## Weniger Risiko, weniger Stress, weniger Kosten!

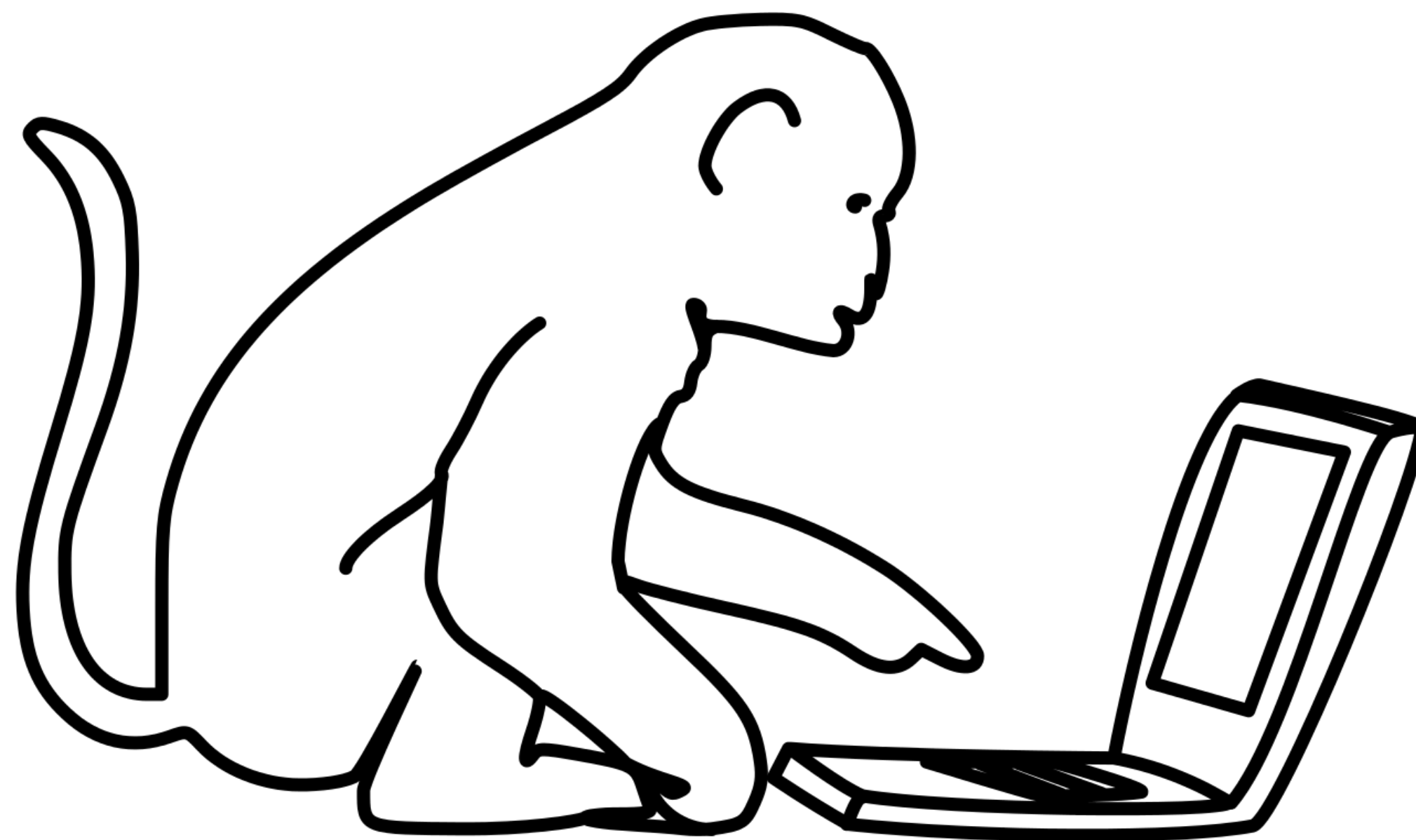
Haben Sie genug vom Testen?

Direkt aus der Forschung bietet Ihnen  
ReTest als bisher einziges Produkt  
seiner Art vollautomatisches  
Regressionstesten auf Ebene der  
Benutzerschnittstelle. Damit stellen Sie  
sicher, dass keine unerwünschten  
Seiteneffekte mehr ins Projekt kommen.  
Robustheitstesten von Corner Cases  
bekommen Sie gratis dazu.  
Mit ReTest behalten Sie die Kontrolle!





- gremlins.js
- NetFlix Chaos Monkey
- UI/Application Exerciser Monkey







```
1. public static void main(String... args) throws Exception {
2.     WebDriver driver = new FirefoxDriver();
3.     driver.get("http://www.retest.de");
4.     while (true) {
5.         List<WebElement> links = driver.findElements(By.tagName("a"));
6.         links.get(random.nextInt(links.size())).click();
7.         Thread.sleep(500);
8.         List<WebElement> fields =
9.             driver.findElements(By.xpath("//input[@type='text']"));
10.        WebElement field = fields.get(random.nextInt(fields.size()));
11.        field.sendKeys(randomString());
12.        Thread.sleep(500);
13.    }
14. }
```



Intelligent Monkey



DEMO



# Vollautomatisches Regressionstesten. Weniger Risiko, weniger Stress, weniger Kosten!

Haben Sie genug vom Testen?  
Direkt aus der Forschung bietet Ihnen  
ReTest als bisher einziges Produkt  
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bekommen Sie gratis dazu.  
Mit ReTest behalten Sie die Kontrolle!





### HumiCalc with Uncertainty

File Options Help

**Configuration**

Temperature Scale: ITS-90 Carrier Gas: Dry Air Mode: Normal  
Equilibrium Over: Water Apply Enhancement Factors:  Known: Dew Point

**Known Values (Standard u)**

Dew Point: 10.0 ±0.0577  
Temperature: 25.0 ±0.025  
Pressure: 14.7 ±0.025

**Units**

Temperature: °C  
Pressure: psia  
Vapor Pressure: Pa  
Density and Abs Humidity: g/m<sup>3</sup>  
Enthalpy: J/g

**Calculated Values (Expanded U with 95.45% Confidence)**

%RH	38.7340793	±0.3212	Specific Humidity	0.0076028	±6E-005
Frost Point			Absolute Humidity	8.962178468	±0.0694
Dew Point	10.0	±0.1155	Dry Air Density	1169.837556	±4.0342
PPMv	12314.00364	±105.31	Moist Air Density	1178.799735	±4.033
PPMw	7661.045263	±65.521	Saturation Temperature		
Grains/lb	53.62731684	±0.4586	Saturation Pressure		
Enthalpy	44.63021277	±0.1744	Wet Bulb Temperature	16.10904106	±0.0559
SVP@Tt	3169.90395	±9.4493	Mixing Ratio by Volume	0.012314004	±0.0001
SVP@Td	1228.13339	±9.5028	Mixing Ratio by Weight	0.007661045	±7E-005
SVP@Ts			Percent by Volume	1.216421347	±0.0103
F@Tt,Pt	1.004109348	±1E-005	Percent by Weight	0.760279987	±0.0065
F@Td,Pt	1.003863842	±1E-005	Vapor Mole Fraction	0.012164213	±0.0001
F@Ts,Ps			Dry Air Mole Fraction	0.987835787	±0.0001

**Calculate**



**Jahreszeugnisse** RBE

Name, Vorname: **Mustermann** Email

Kopfbilder: **Verhalten**: 2 **Mitarbeiter**: 2

Leistungen in den einzelnen Fächern u. Fächerverbänden

Ethik	4	Relig.	1
Deutsch	4	Physik	4,3
Englisch	4	Chemie	3,9
Mathematik	4	Biologie	3,7
Geschichte	0	Sport	3
EWG	3	Musik	4
Erdbunde		Bildende Kunst	4
Gemeinschaftskunde		Technik	3
TOP Informatik	2	TOP VWK	0
TOP Tech. Arbeiten		TOP Social. Engagement	2

Arbeitsgemeinschaften: **AG Kunst**

Freizeitaktivitäten: **5** unerschützte, **0** Freizeitstunden, **2** unerschützte

Bemerkungen: **Einmal war für die Klassenkasse zuständig.**

Auswahl: **Erster Schüler** (4 von 25), **Letzter Schüler**

Engagement: **3,4**

Notenskala: **1-5**

**Lagerverwaltung WM 2000** Dienstag, 5. Juni 2007 Jahr/Woche 07/23 Demo Version GmbH

Einzelkartei: **ALU00700** **ALU00700**

Spezifikation: **Spezifikation** **Spezifikation**

Bestand: **2.000** **1.852**

Einheit: **kg** **m**

Währung: **€**

Preis-Ziele: **7,675**

**S.F.K. GmbH 2003** Geschäftsjahr 10.2003 Rückzeitraum 01.01.2003 - 31.10.2003

Buchen: Sachkonten Allgemeinbeleg

Deutsche Asphalt HPPFH EUR 0,00 Erlöse Hotline - Wartung EUR 142.747,17 H

Summe: **2.300,00** **300,00**

Konto	KS	SK	Saldo	Datum	Summe	Saldo
6700			30,00	13.10.2003		30,00
6700			500,00	09.10.2003		530,00
6700			107,76	09.10.2003		637,76
6700			1.035,00	08.10.2003		1.672,76
6700			369,09	08.09.2003		2.041,85
6700			986,64	08.09.2003		3.028,49
6700			20,00	02.10.2003		3.048,49
6700			500,00	02.10.2003		3.548,49
Summe Primkonto			7.260,30			7.260,30

**S.F.K. GmbH 2003** Geschäftsjahr 10.2003 Rückzeitraum 01.01.2003 - 31.10.2003

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Konto	KS	SK	Saldo	Datum	Summe	Saldo
6700			30,00	13.10.2003		30,00
6700			495,00	14.10.2003		525,00
6700			6915,00	09.10.2003		7.440,00
6700			145,00	08.10.2003		7.585,00
6700			4270,00	06.10.2003		11.855,00
6700			4830,00	06.10.2003		16.685,00
6700			4995,00	02.10.2003		21.680,00
6700			143,00	02.10.2003		21.823,00
Summe Primkonto			7.260,30			7.260,30

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Geschichte	0	Sport	3
EWG	3	Musik	4
Erdbunde		Bildende Kunst	4
Gemeinschaftskunde		Technik	3
TOP Informatik	2	TOP VWK	0
TOP Tech. Arbeiten		TOP Social. Engagement	2

Arbeitsgemeinschaften: **AG Kunst**

Freizeitaktivitäten: **5** unerschützte, **0** Freizeitstunden, **2** unerschützte

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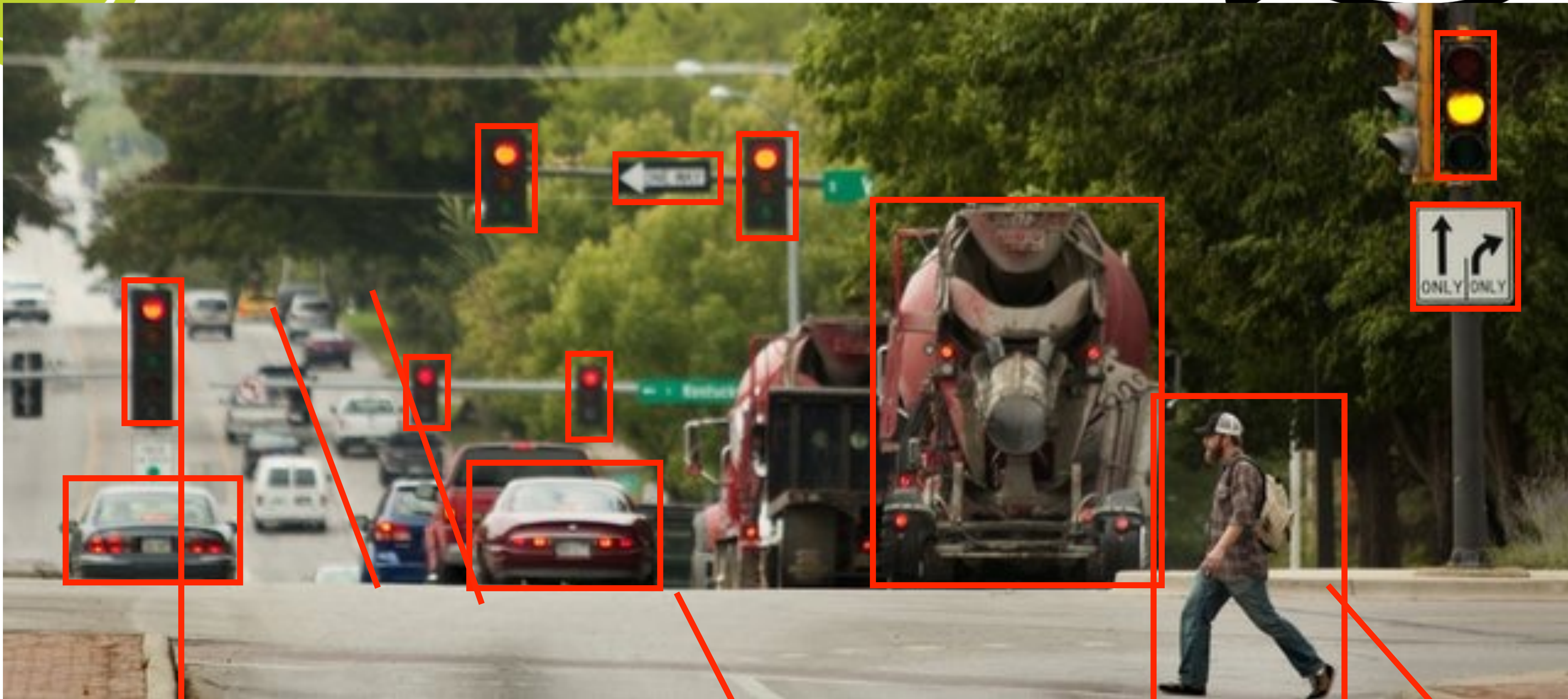
**S.F.K. GmbH 2003** Geschäftsjahr 10.2003 Rückzeitraum 01.01.2003 - 31.10.2003

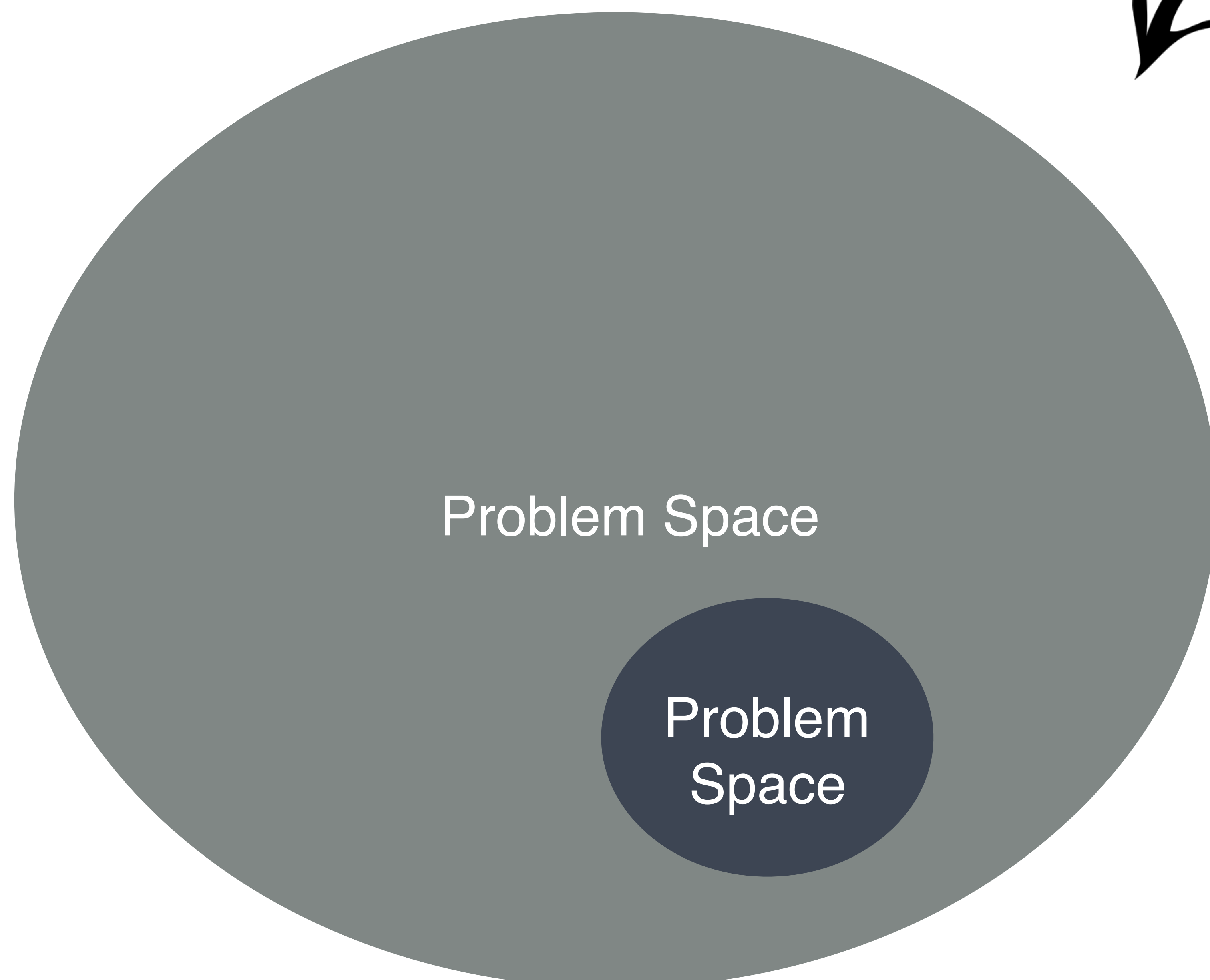
Buchen: Sachkonten Allgemeinbeleg

Deutsche Asphalt HPPFH EUR 0,00 Erlöse Hotline - Wartung EUR 142.747,17 H

Summe: **2.300,00** **300,00**

Konto	KS	SK	Saldo	Datum	Summe	Saldo
6700			30,00	13.10.2003		30,00
6700			495,00	14.10.2003		525,00
6700			6915,00	09.10.2003		7.440,00
6700			145,00	08.10.2003		7.585,00
6700			4270,00	06.10.2003		11.855,00
6700			4830,00	06.10.2003		16.685,00
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6700			143,00	02.10.2003		21.823,00
Summe Primkonto			7.260,30			7.260,30





Problem Space

Problem  
Space







**Jahreszeugnisse**  
Name, Vorname: [ ]  
Mustername: [ ]  
Verhalten: 2  
Leistungen in den einzelnen Fächern u. Fächerverbänden:  
Einsch. Deutsch: 4, Englisch: 4, Mathematik: 4, Geschichte: 0, EWG: 3, Erdkunde: 3, Gemeinschaftskunde: 2, TOP Informatik: 2, TOP Tech. Arbeiten: 2  
SE Testat: [ ]  
Arbeitsgemeinschaften: [ ]  
Anmerkungen: [ ]

**Lagerverwaltung**  
Lager-Liste  
Suchen: [ ]  
Artikel: [ ] Menge: [ ]  
Spezial: [ ]  
Pro-Date: 7.675

**Sachkonten Allgemeinbeleg**  
Konto: [ ]  
Betrag: [ ]  
Saldo: [ ]  
Summe Primkonto: 7.260,30

Konto	KSt	M1	KSt	M2	Beleg	Datum	Saldo	Haben	Text	Faktura	Anspr	
1410	6700			147	13.10.2003		30,60		Gewerbesteuer Rückz. 2003		147	
1410	4995			147	13.10.2003			500,00	Speisen		147	
1410	4915	1	146	09.10.2003				107,76	Telefon		146	
1410	0			145	08.10.2003		1.035,00		Kfz-Polka		145	
1410	4270			144	06.10.2003			369,08	Lea 9.03		144	
1410	4995			143	02.10.2003			20,50	OP		143	
1410	4995			143	02.10.2003			500,00	Entnahme		143	
Matus - Alter Buchhaltungsgang in Arbeit												
Summe Primkonto								7.260,30				

**Lagerverwaltung**  
Lager-Liste  
Suchen: [ ]  
Artikel: [ ] Menge: [ ]  
Spezial: [ ]  
Pro-Date: 7.675

**Jahreszeugnisse**  
Name, Vorname: [ ]  
Mustername: [ ]  
Verhalten: 2  
Leistungen in den einzelnen Fächern u. Fächerverbänden:  
Einsch. Deutsch: 4, Englisch: 4, Mathematik: 4, Geschichte: 0, EWG: 3, Erdkunde: 3, Gemeinschaftskunde: 2, TOP Informatik: 2, TOP Tech. Arbeiten: 2  
SE Testat: [ ]  
Arbeitsgemeinschaften: [ ]  
Anmerkungen: [ ]

**Sachkonten Allgemeinbeleg**  
Konto: [ ]  
Betrag: [ ]  
Saldo: [ ]  
Summe Primkonto: 7.260,30



Geburtsdatum

**Geburtsdatum** ✕

◀ **December 1980** ▶

S	M	T	W	T	F	S
30	<b>1</b>	<b>2</b>	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	<b>22</b>	23	24	25	26	27
28	29	30	31	1	2	3



Sales Order - SO-000075 - Customer-01

Home Help CRM Ship To

New Save Undo Find Void Print Customer Detail Create Purchase Order Create Drop Ship Order Duplicate Sales Order Import Sales Quote Convert To Sales Invoice

Data Report Tools

Order Customer Payment Sales Rep History Audit Trail Attachments MaxMind Shipment List

Order Code: SO-000075 Alternate Order #:   
 Order Date: 11/4/2011 Location: Main Warehouse  
 Customer PO:  Web Store: Default Website  
 Payment Term: Terms 30 Days from Document Date Source: Amazon website  
 Shipping Method: User Entered Delivery Charge Coupon Code: 10 Amount Orders  Allow BO  
 Currency: USD 1.000000 Ship Date: 11/4/2011  Shipped  
 Contact: Customer-01 Opportunity: Would like to discuss requirements

Custom Fields Notes Accounts Workflow Trading Info

Accounts Receivable: Accounts Receivable  
 Freight: Freight Income  
 Discount Given: Settlement Discounts Allowed  
 Other: Other Income

Inventory Overall Availability Commission Shipped Profit

Item Code	Quantity	Allocate	Reserved	UM	Description	Location	Type	Sales Price	Net Price	Ext Price
Test Item 01	1.00	1.00	0.00	EACH	Test Item 01	Main Warehouse		\$ 600.00	\$ 597.39	\$ 597.39
Test Item 02	1.00	1.00	0.00	EACH	Test Item 02	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61
Test Item 01	1.00	1.00	0.00	EACH	Test Item 01	Main Warehouse		\$ 600.00	\$ 597.39	\$ 597.39
Test Item 02	1.00	1.00	0.00	EACH	Test Item 02	Main Warehouse		\$ 550.00	\$ 547.61	\$ 547.61

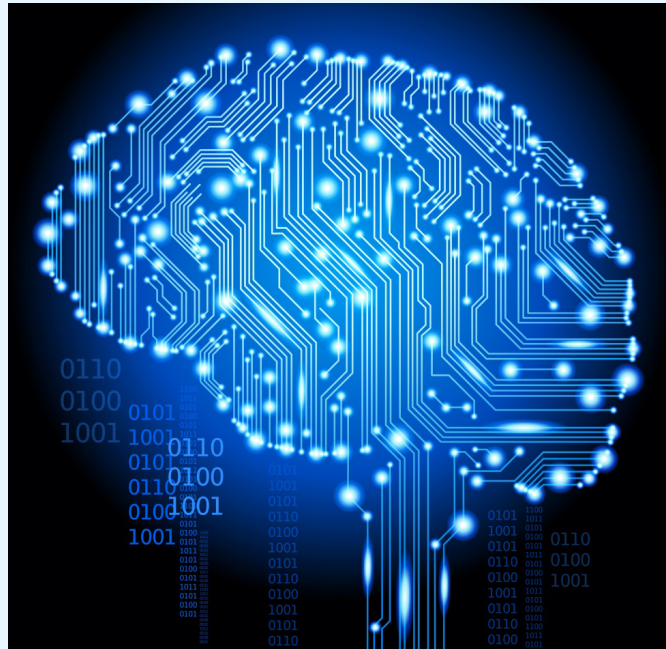
Addresses: Bill To: Customer-01 Ship To: Customer-01

Summary: Sub Total Freight Other Sales Tax

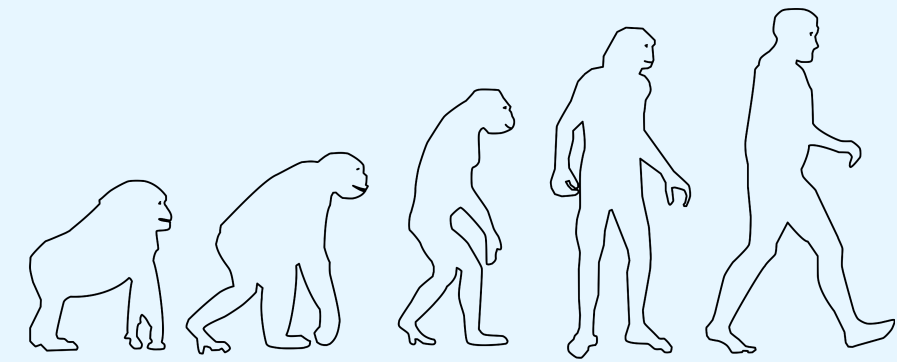
MacBook Pro



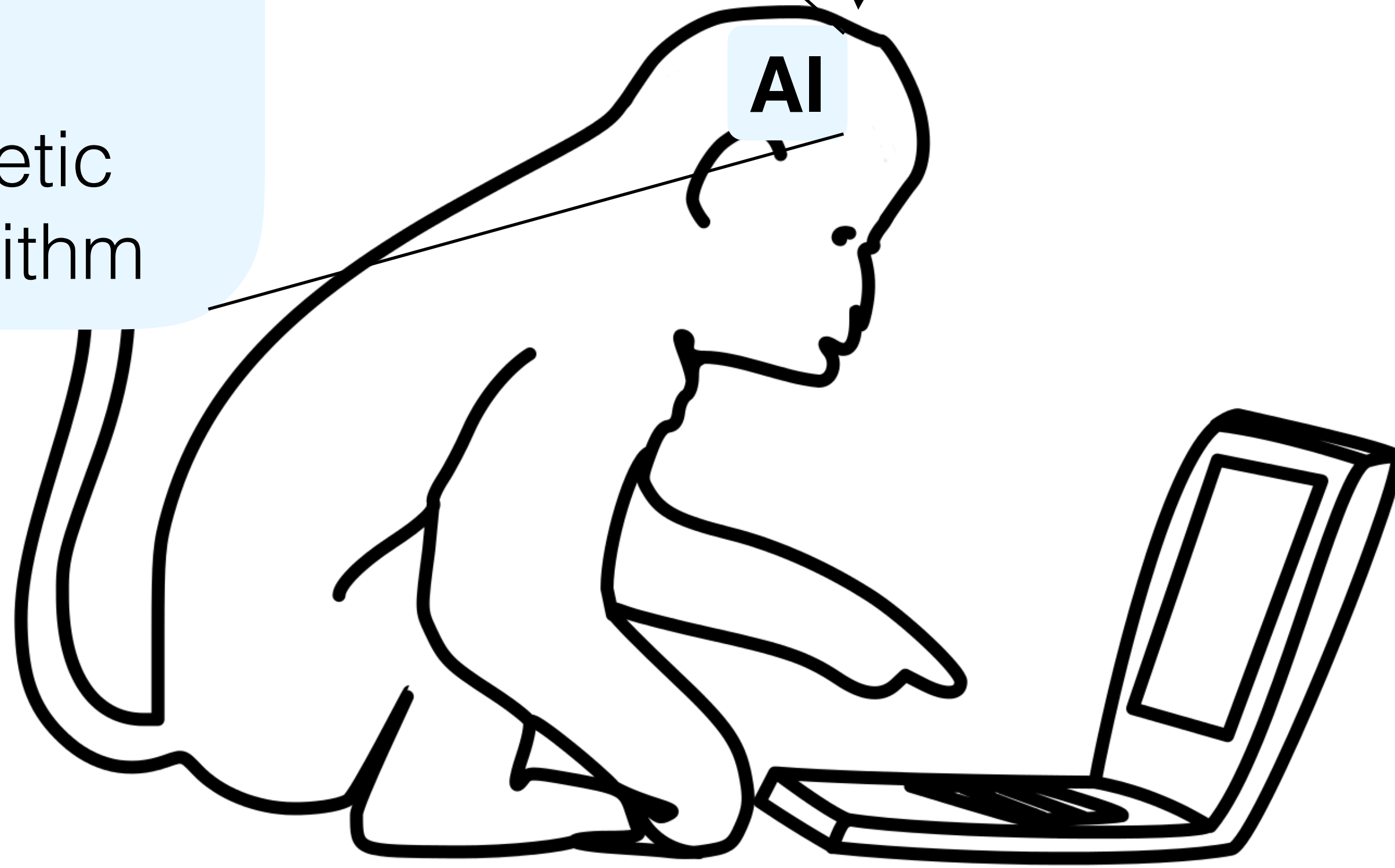
**AI**



Artificial Neural Net



Genetic Algorithm



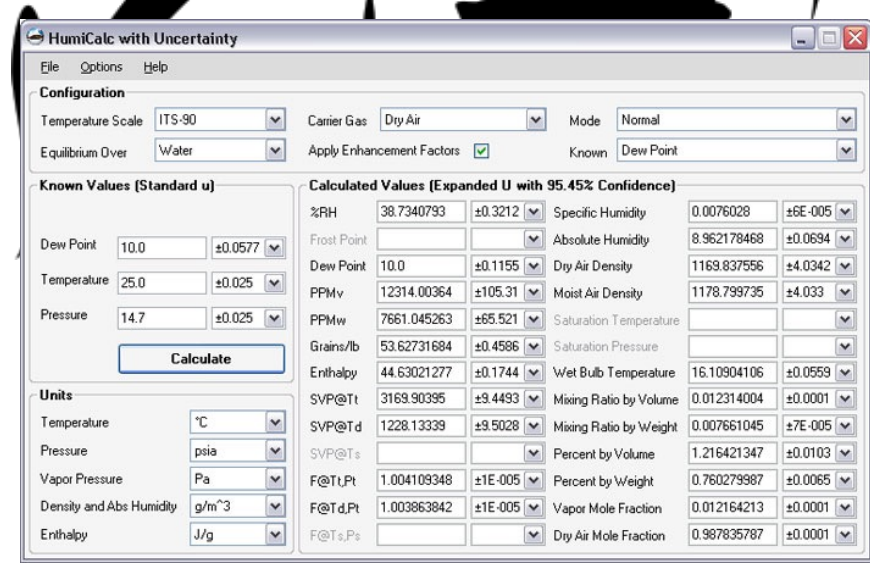
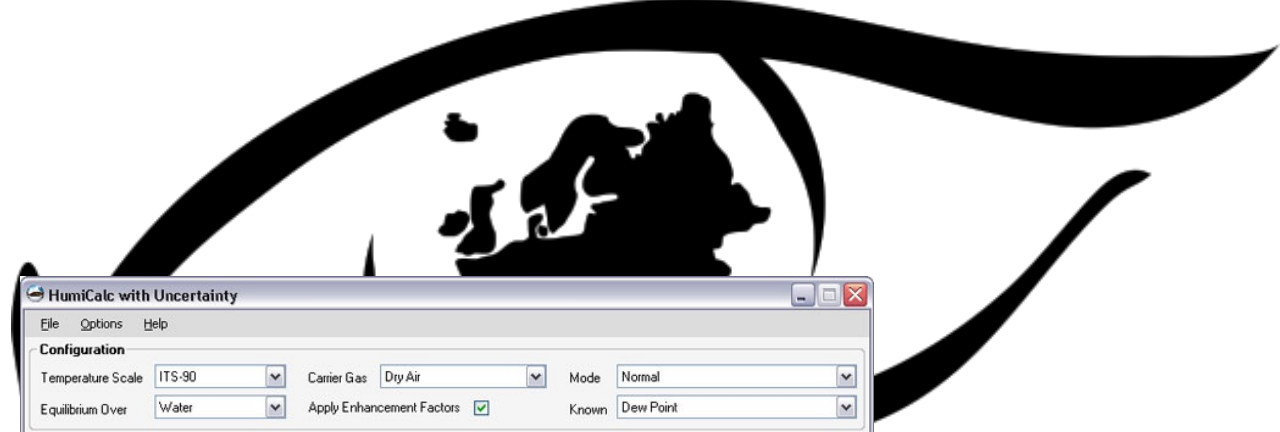
train



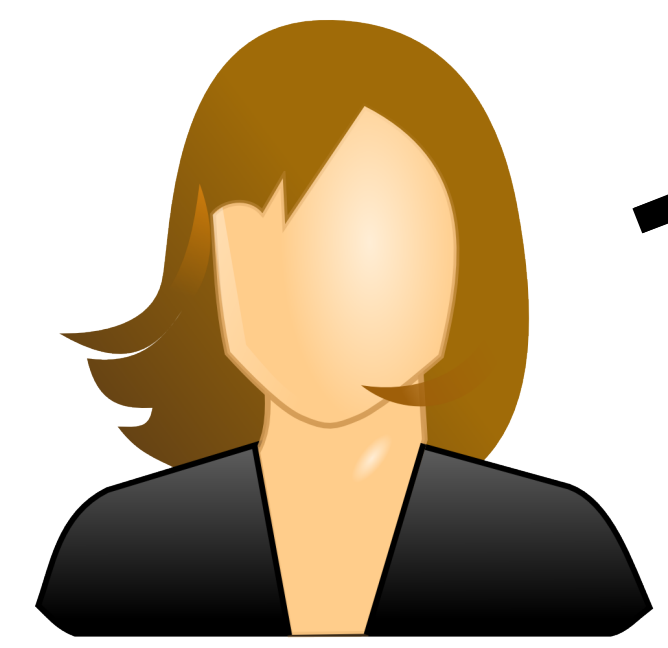


**sapienz**

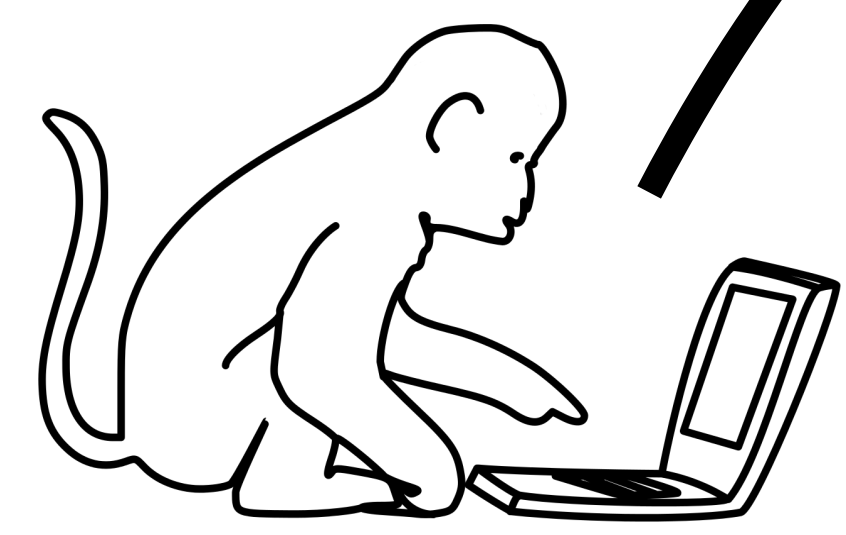
<https://code.fb.com/developer-tools/sapienz-intelligent-automated-software-testing-at-scale/>



1.0



user



test

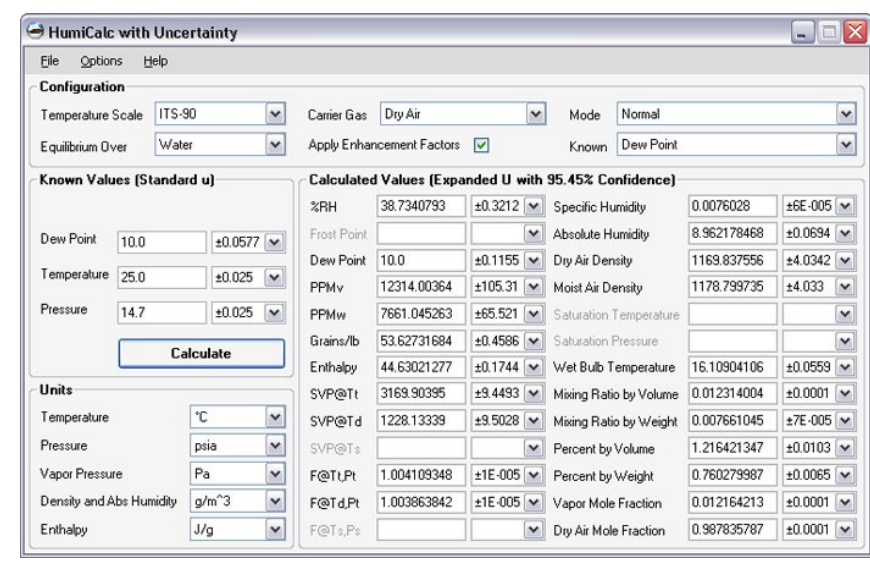
train

automate

approve

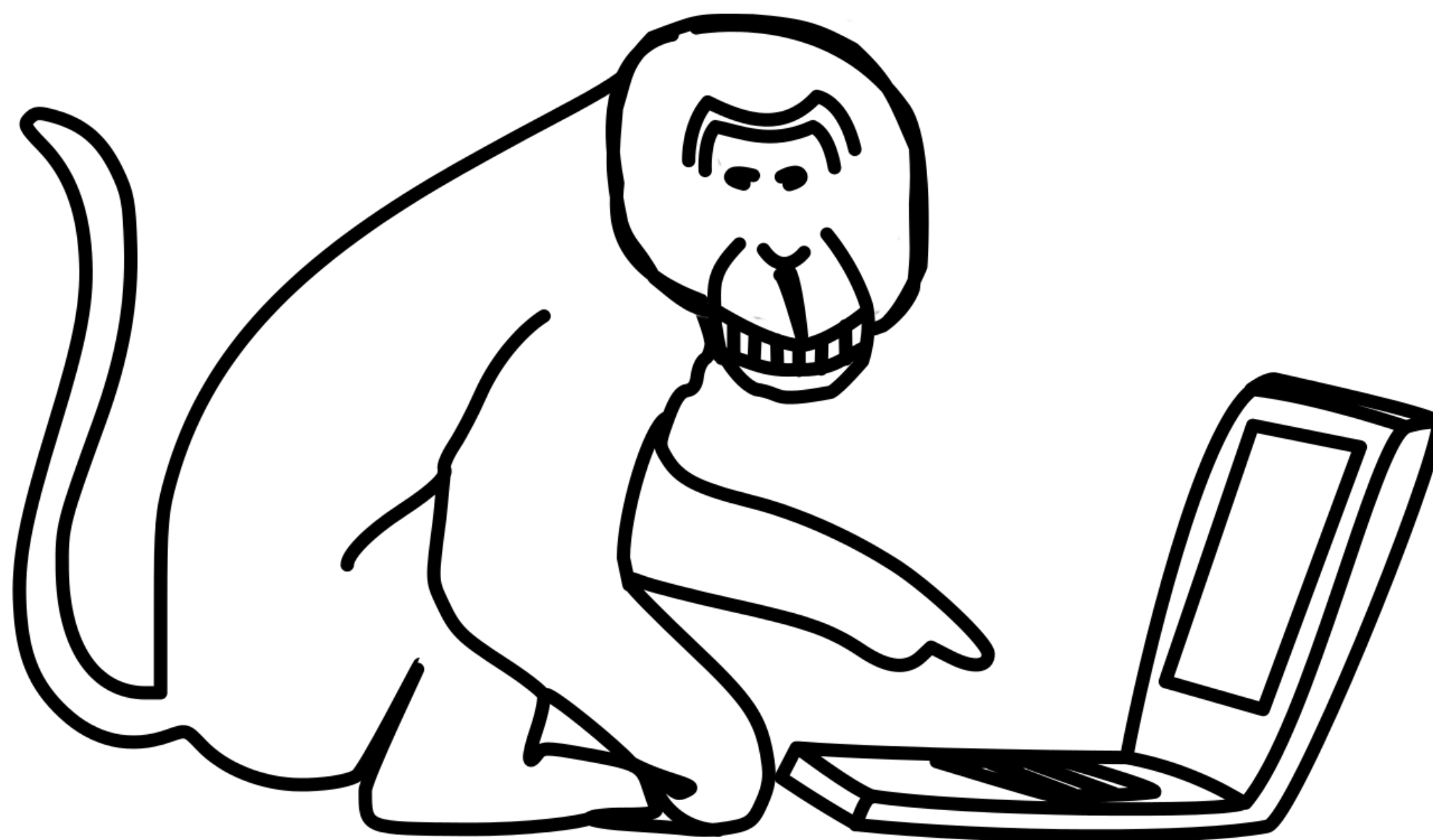


diff



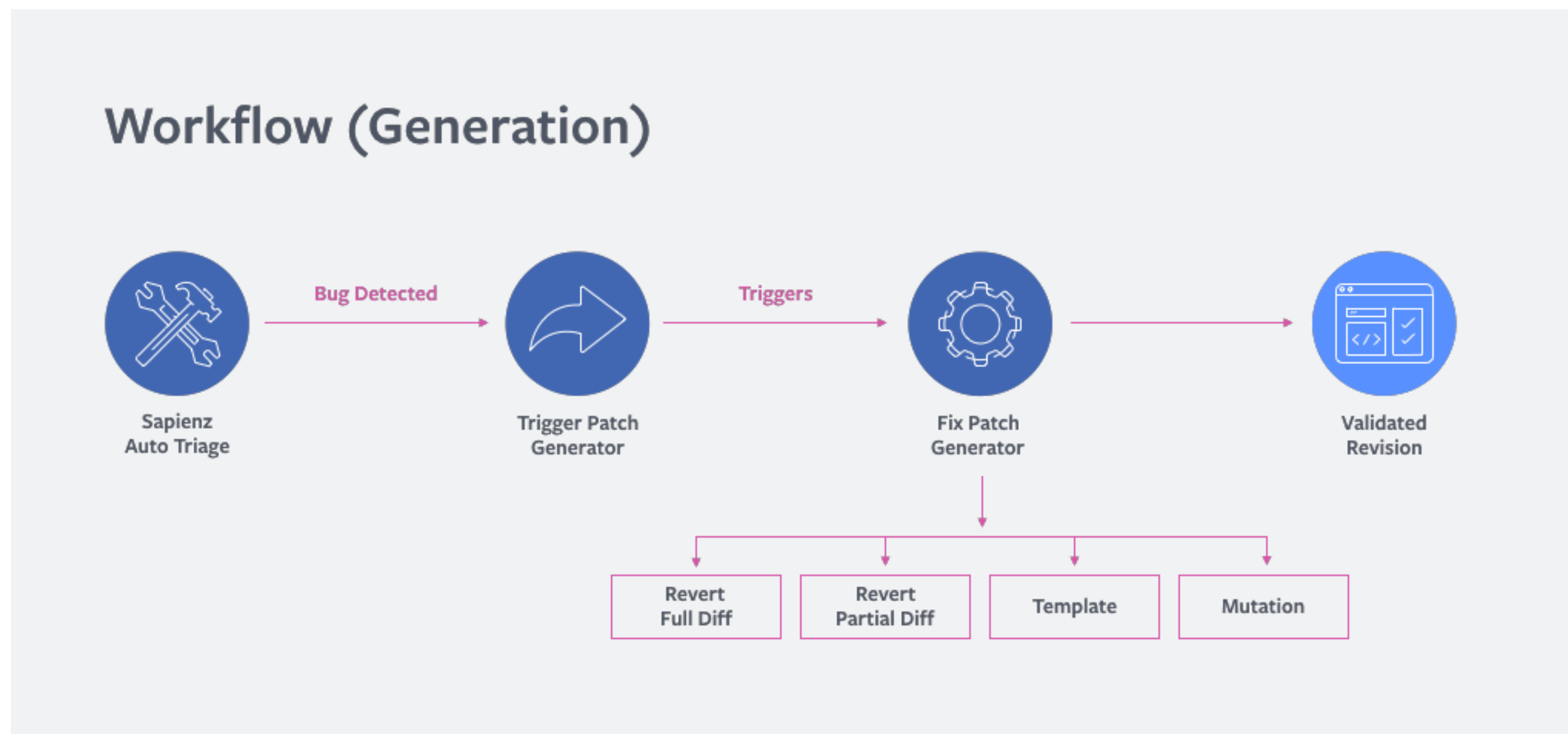
1.1

@roesslerj

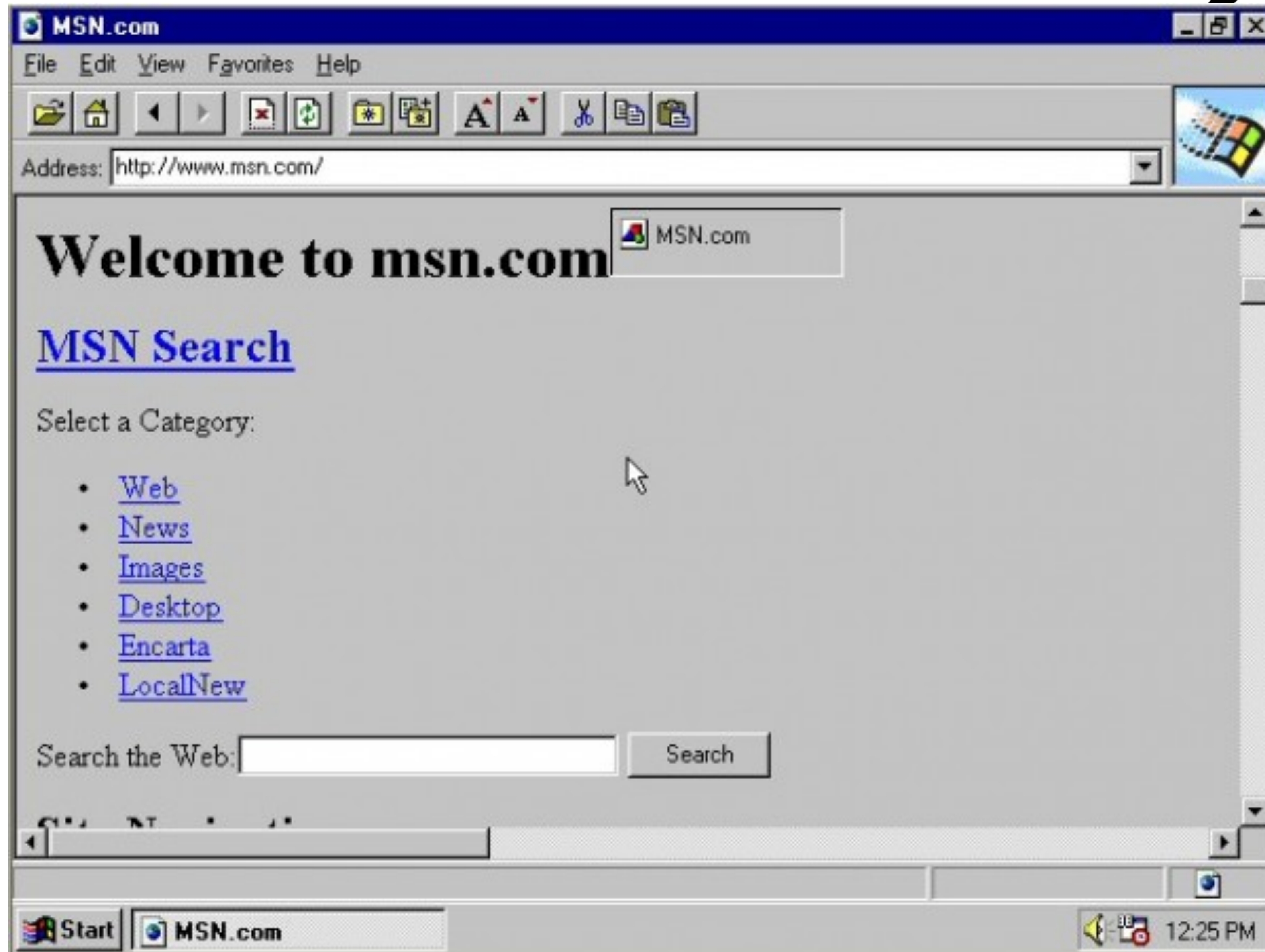




# Automatically Fixing Bugs



<https://code.fb.com/developer-tools/finding-and-fixing-software-bugs-automatically-with-sapfix-and-sapienz/>





# Summary



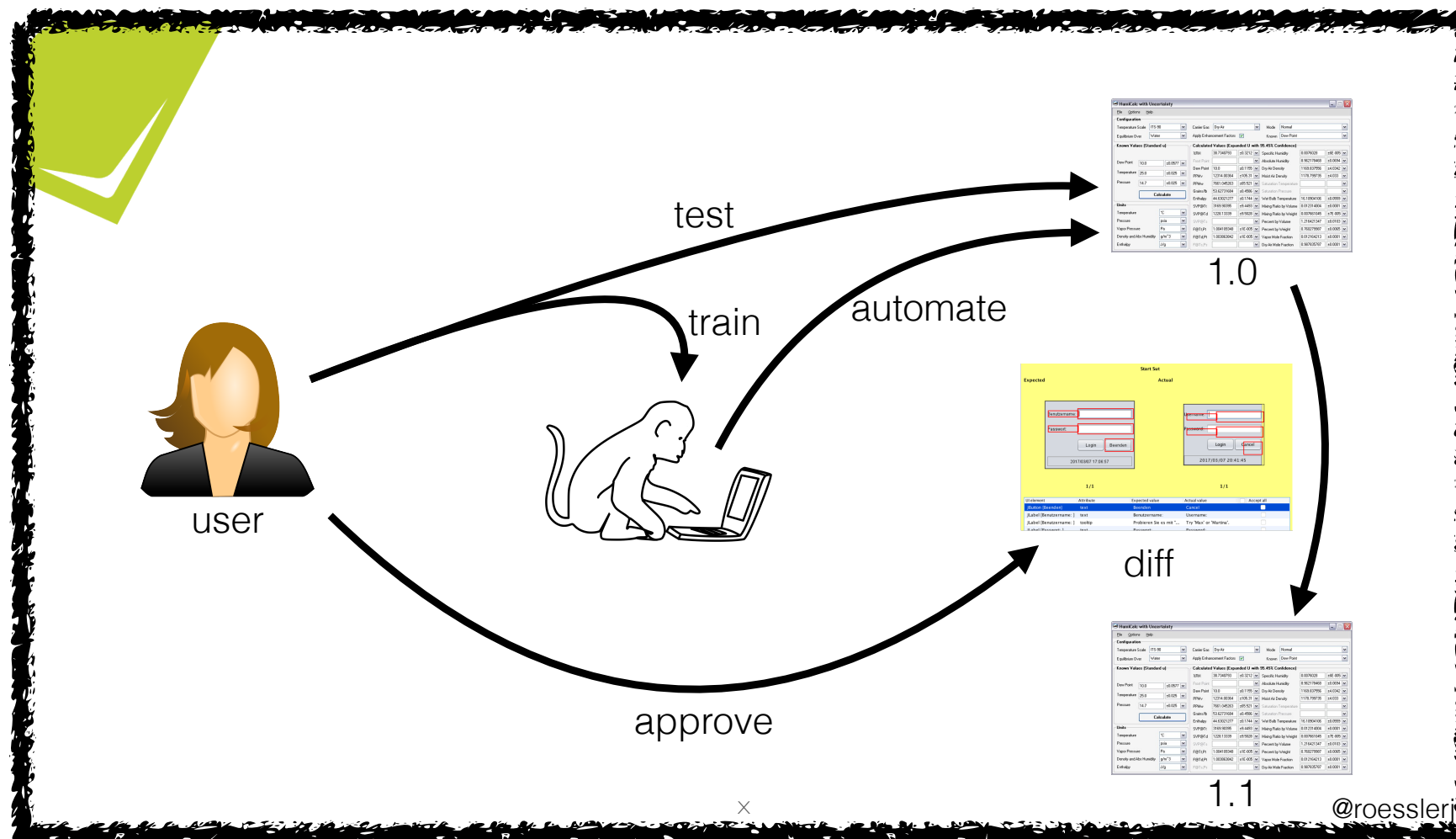
<https://github.com/retest/recheck-web>

```
17 public class SeleniumLargeTest {
18
19     private Vertex vertex;
20     private WebDriver driver;
21     private Recheck re;
22 }
```

@roesslerj

## Difference Testing

little maintenance  
no wasteful testing  
yet more complete



## Monkey-Testing:

cheaper  
faster  
multiplies manual tests



[roessler@retest.de](mailto:roessler@retest.de)



<https://www.facebook.com/retest.de>



<http://retest.rocks>