

23.04.2024, APEX CONNECT

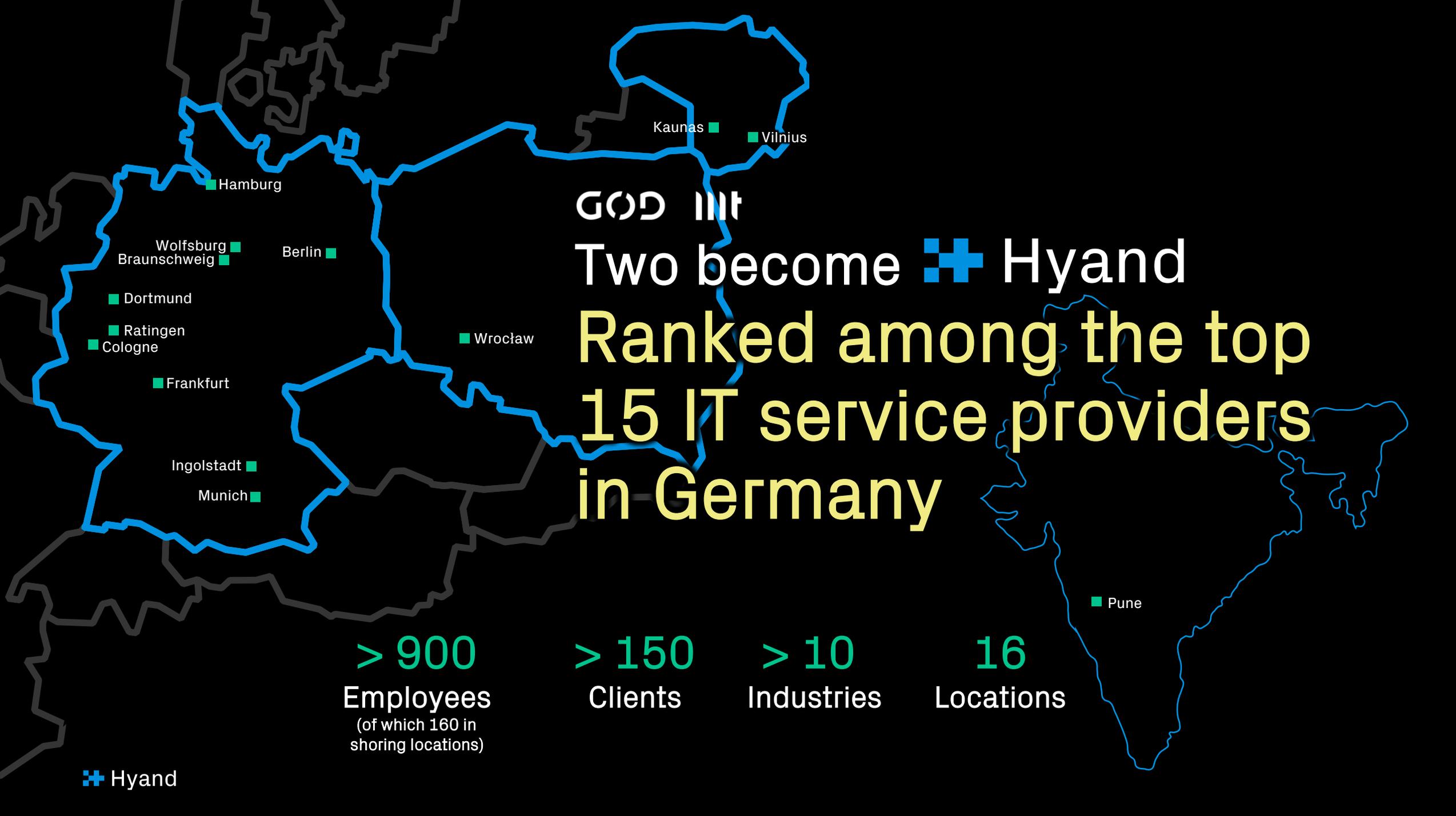
LCT – Lessons Learned from 5 years of LCT

Kai Donato, Department Manager

Lynn Nari Lenffer, Senior Consultant

code of change

 **Hyand** by
GOD | MT



GOD IT

Two become Hyand Ranked among the top 15 IT service providers in Germany

> 900
Employees
(of which 160 in
shoring locations)

> 150
Clients

> 10
Industries

16
Locations

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Session



Kai Donato
Product Manager



Fabian Neureiter
Lead Developer



Marcel von Rhein
Developer/Tester



Moritz Klein
Architect



Lynn Lenffer
Developer



Chris Röhrs
Developer



Philipp Hartenfeller
Lead Backend Developer

THANK YOU!

Top features of LCT

- No coding required
- Test thoroughly
- Multibrowser Testing
- Accessible APEX-Frontend
- An APEX App to test YOUR APEX Apps

Timeline

- 2019** First idea by Kai (preparing for conference)
- 2020** Further development as bachelor thesis by Fabian
First time at a customer (still in development)
- 2021** Testing our internal applications with LCT
- 2022-** LCT used by several different customers
More bachelor theses based on LCT

LCT – Steps and Cases

The screenshot displays the LCT - Low Code Testing interface. The top navigation bar includes a menu icon, the LCT logo, and a 'Log Out' link. The left sidebar contains navigation options: Worksheets, Queue, Import/Export, Test Suites, and Administration. The main content area is titled 'Worksheets | Sample Test Sheet |'. It shows metadata for the worksheet: 'Sample Test Sheet' (Application ID: 100, Updated By: FNEUREITER@MT-AG.COM, Updated On: 06.11.2023). Action buttons include '(x) Worksheet Variables', 'Worksheet Files', 'Edit Worksheet', and 'Run Worksheet'. Below this, the 'Cases' section shows a list with 'Fill Add Customer-Form' selected. The 'Steps' section features a search bar, 'Go', 'Actions', 'Edit', 'Save', '+ Add Step', 'Copy', 'Add Steps via Template', 'Move Up', 'Move Down', and 'Resequence Steps'. A table lists the steps with columns for Edit, Sequence, Type, Name, and Enabled.

	Edit	Sequence	Type	Name	Enabled
<input type="checkbox"/>		10	↖	Go to page 2	Yes
<input type="checkbox"/>		20	🖱	Perform click on Create Customer	Yes
<input type="checkbox"/>		30	↔	Switch to iframe context	Yes
<input type="checkbox"/>		40	📄	Perform fillField on First Name	Yes
<input type="checkbox"/>		50	📄	Perform fillField on Last Name	Yes
<input type="checkbox"/>		60	📄	Perform selectOption on State	Yes
<input type="checkbox"/>		70	📄	Perform fillField on Zip Code	Yes
<input type="checkbox"/>		80	📄	Perform fillField on Credit Limit	Yes
<input type="checkbox"/>		90	🖱	Perform click on Add Customer	Yes

LCT – Queue

LCT – Low Code Testing
LLENFFER@MT-AG.COM

- Worksheets
- Queue**
- Import/Export
- Test Suites
- Administration

Queue \

Search: All Text Columns

General			Execution				Audit Values		
Actions	Execution Name	Version	Execution Point	Status	Successful/Total Cases	(min)	Output Log	Created By	Created On
	testTestSuite - Test switch Step - PLA...	#24	28.02.24 11:48					LCT	27.02.2024 11:49:50.36
	testTestSuite - Test checkforError Ste...	#20	27.02.24 11:49		4/4	00:26		LCT	27.02.2024 11:49:09.77
	testTestSuite - Test switch Step - PLA...	#24	27.02.24 11:48		0/1	00:13		LCT	26.02.2024 11:49:38.21
	testTestSuite - Test checkforError Ste...	#20	26.02.24 11:48		4/4	00:25		LCT	26.02.2024 11:48:57.88
	testTestSuite - Test switch Step - PLA...	#24	26.02.24 11:48		0/1	00:14		LCT	25.02.2024 11:50:30.33
	testTestSuite - Test checkforError Ste...	#20	25.02.24 11:49		3/4	00:48		LCT	25.02.2024 11:49:27.34
	testTestSuite - Test switch Step - PLA...	#24	25.02.24 11:48		0/1	00:14		LCT	24.02.2024 11:49:52.25
	testTestSuite - Test checkforError Ste...	#20	24.02.24 11:49		4/4	00:26		LCT	24.02.2024 11:49:13.97
	testTestSuite - Test switch Step - PLA...	#24	24.02.24 11:48		0/1	00:16		LCT	23.02.2024 11:49:46.41
	testTestSuite - Test checkforError Ste...	#20	23.02.24 11:48		3/4	00:51		LCT	23.02.2024 11:48:34.31
	testTestSuite - Test switch Step - PLA...	#24	23.02.24 11:48		0/1	00:10		LCT	22.02.2024 11:49:16.51
	Test setDatePicker Step - 23.02.2024	#9	23.02.24 10:49		1/1	00:04		FNEUREITER@MT...	23.02.2024 10:49:39.20
	testTestSuite - Test checkforError Ste...	#20	22.02.24 11:48		4/4	00:25		LCT	22.02.2024 11:48:33.97
	testTestSuite - Test switch Step - PLA...	#24	22.02.24 11:48		0/1	00:11		LCT	21.02.2024 11:50:03.08

LiveLog - Queue ID: 623

```

249 ✓ locator.click(iframe >> internal:control-enter-frame >> [role=
action=save]) (118 ms)
250 /* |> StepEnd: #913 (128ms) */
251 /* |> StepStart: #910 */
252 ✓ page.waitForLoadState (3 ms)
253 ✓ locator.count(iframe >> internal:control-enter-frame >>
#t_Alert_Notification) (18 ms)
254 ✓ locator.innerText(iframe >> internal:control-enter-frame >>
#t_Alert_Notification >> nth=0) (17 ms)
255 ✓ locator.count([role=alertdialog]) (11 ms)
256 ✓ locator.count(iframe >> internal:control-enter-frame >>
span[class="a-Form-error u-visible"] .t-Form-error) (11 ms)
257 ✓ locator.count(iframe >> internal:control-enter-frame >> .a-I6-
body td[role=gridcell][class=is-error]) (18 ms)
258 ✓ locator.innerText(iframe >> internal:control-enter-frame >> .a-
I6-body td[role=gridcell][class=is-error] >> nth=0) (18 ms)
259 ✓ locator.innerText(iframe >> internal:control-enter-frame >> .a-
I6-body td[role=gridcell][class=is-error] >> nth=1) (17 ms)
260 ✓ locator.count(iframe >> internal:control-enter-frame >>
[class=t-Alert--wizard]) (16 ms)
261 /* |> Error of Type "Notification Error" found 1 time(s). */
262 /* |> Error of Type "Interactive Grid Cell Error" found 2 time(s). */
263 /* |> StepEnd: #918 (378ms) */
264 /* |> StepStart: #907 */
265 ✓ page.screenshot (148 ms)
266 /* |> StepEnd: #907 (144ms) */
267 ✓ apiRequestContext.dispose (1 ms)
268 ✓ fixture: request (3 ms)
269 ✓ fixture: page (0 ms)
270 ✓ fixture: context (0 ms)
271 ✓ page.screenshot (148 ms)
272 ✓ After Hooks (171 ms)
273 > Finished Case "Test various error types - Grid Modal " (7310 ms |
Status ✓ ("passed"))
274
275

```

LCT – Test Suites

LCT – Low Code Testing LLENFFER@MT-AG.COM

Runs: 10

Worksheets (Top 10 Most Failures)

Worksheet	Success	Failure
Test switch Step - Chromium	0	10
Test checkforError Step - Firefox	6	4

Cases (Top 10 Most Failures)

Case	Success	Failure
Test switch Step - Chromium - Test Switch Elements	0	10
Test checkforError Step - Firefox - Test various error types - Grid Modal	8	2
Test checkforError Step - Firefox - Test various error types - Modal	8	2
Test checkforError Step - Firefox - Test various error types	10	0
Test checkforError Step - Firefox - Test various error types - Grid	10	0

Outcome Trend Worksheets (%)

Worksheet	Success (%)	Failure (%)
Test switch Step - Chromium	0	100
Test checkforError Step - Firefox	60	40

Outcome Trend Cases (%)

Case	Success (%)	Failure (%)
Test switch Step - Chromium - Test Switch Elements	0	100
Test checkforError Step - Firefox - Test various error types - Grid Modal	80	20
Test checkforError Step - Firefox - Test various error types - Modal	80	20
Test checkforError Step - Firefox - Test various error types	100	0
Test checkforError Step - Firefox - Test various error types - Grid	100	0

Run Test Suite
Executes this Test Suite immediately, regardless of the scheduled time.

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Date Picker Step

The screenshot displays the LCT - Low Code Testing interface with a configuration dialog for a 'setDatePicker' step. The background shows a worksheet named 'LCT is the best!' with a case named 'Date Picker' and a step named 'Date Picker'. The dialog box is titled 'Step: setDatePicker' and contains the following fields:

- Step Name:** setDatePicker
- Execution Sequence:** 20
- Item:**
 - Selector Type: Interactive Grid Column (Page Element)
 - Application: 111 - LCT Test App
 - Page: Item: Date Picker
 - Element: Format mask 2: DD.MM.YYYY
- Step Parameters and Values:**
 - Format mask of chosen element: DD.MM.YYYY
 - Date: 10.04.2024
- Options:**
 - Step Timeout (ms): Default: 5000
- Audit Fields:**
 - Created On: 10.04.2024 09:03:37.22
 - Created By: LYNNNARI.LENFFER@HYAND.COM

Buttons for 'Cancel', 'Save', and 'Edit Case' are visible. The bottom of the interface shows 'release 24.1 (25-APR-2024)'.

Single Checkbox Step

The screenshot displays the LCT - Low Code Testing interface with a 'Step: checkOption' configuration dialog open. The dialog is titled 'Step: checkOption' and contains the following sections:

- checkOption**: Interact with Checkboxes, Checkbox Groups and Radio Groups.
- Step Name**: check single grid
- Execution Sequence**: 80
- Item**: Selector Type (Custom, Interactive Grid Column, Page Element), Application (111 - LCT Test App), Page (Item: Checkbox), Interactive Grid (Demo Customers table with Checkbox), and Interactive Grid Column Element (Single Checkbox).
- Step Parameters and Values**: check (selected), uncheck.
- Options**: Step Timeout (ms) (Default: 80), Delay (ms) (Default: 0), Trial (Yes/No), and Force Interaction (Yes/No).
- Enabled**: A table with a header 'Enabled' and a column of 'Yes' values.

At the bottom of the dialog are 'Cancel', 'Save', and a trash icon. The background interface shows a worksheet named 'LCT is the best!' with a case named 'Single Checkbox' and a step list.

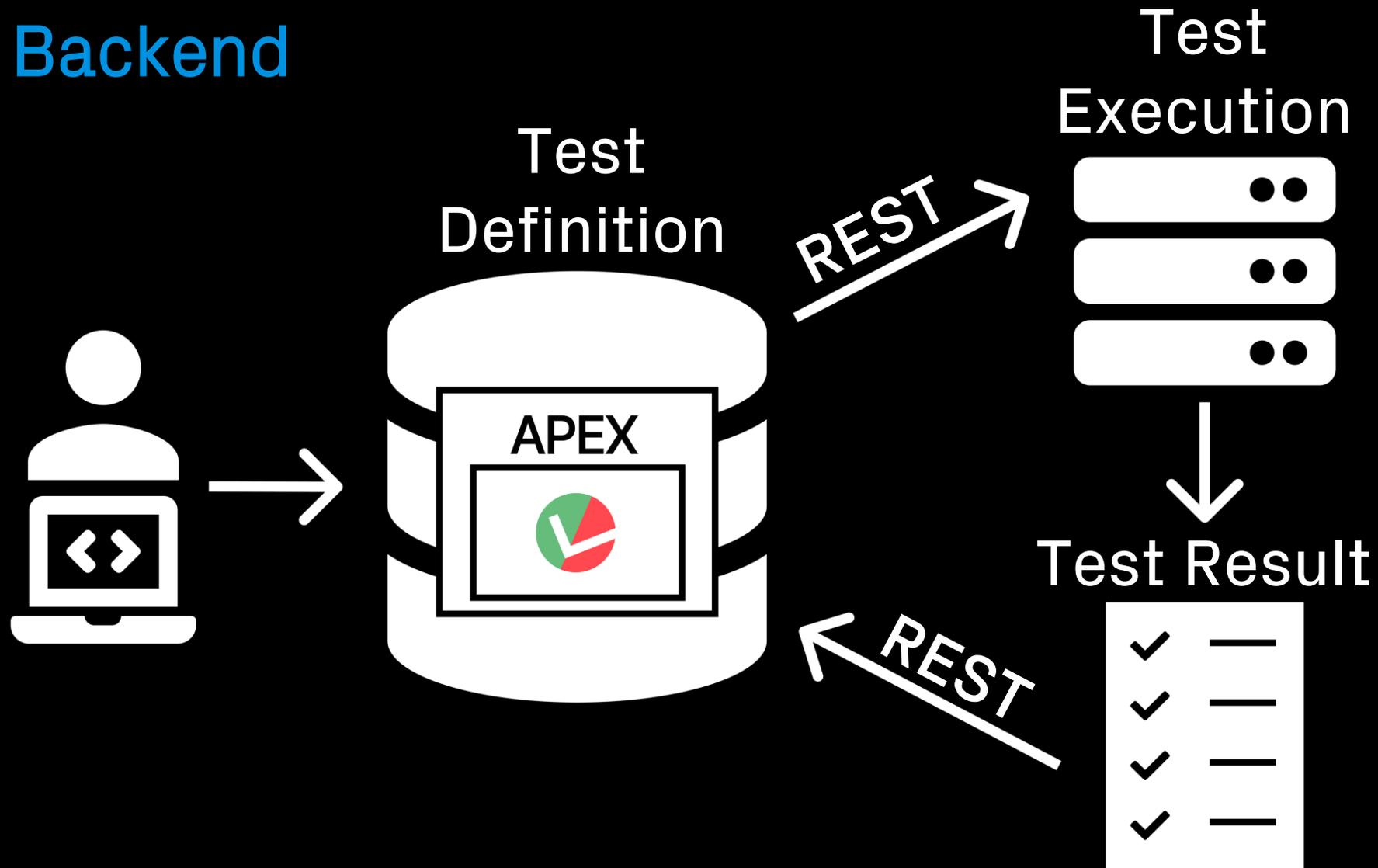
Soft Delete Worksheets

The screenshot shows the 'Deleted Worksheets' page in the LCT - Low Code Testing application. The page features a search bar at the top with the text 'Search: All Text Columns' and a 'Go' button. Below the search bar is a table with two columns: 'General' and 'Audit Values'. The 'General' column contains 'App ID', 'Name', and 'Description'. The 'Audit Values' column contains 'Updated By' and 'Updated On'. There are two rows of data in the table:

General			Audit Values	
App ID	Name	Description	Updated By	Updated On
111	Test switch Step (2)		FNEUREITER@MT-AG.COM	11.01.2024 14:26:04.15
100	delete me		LYNNNARI.LENFFER@HYAND.C...	12.04.2024 16:06:23.12

At the bottom of the page, there is a footer with the text 'release 24.1 (25-APR-2024)' and a small circular icon with an upward arrow.

REST Backend



Upcoming Release 24.1

More Features

- Custom email procedure
- UI Enhancements
- Changes in Playwright
- Various minor bug fixes

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Lessons learned (in the field)

Lessons learned

- No one has time to test!
- Users have different backgrounds/levels of knowledge
- Management views are very important
- Not every customer has the latest version of APEX
- Following and knowledge of Best Practices
- Features based on users

Lessons learned (in the field)

Management Views

The image displays two screenshots of the LCT - Low Code Testing interface. The top screenshot shows the 'Test Suites' management view, and the bottom screenshot shows the 'Queue' management view. Both views include a search bar, a 'Go' button, and an 'Actions' dropdown menu. The 'Test Suites' view has a table with columns for Name, Description, Latest execution (Successful/Total Executions), Created On, and Created By. The 'Queue' view has a table with columns for Actions, Execution Name, Version, Execution Point, Status, Successful/Total Cases, (min), Output Log, Created By, and Created On. A 'LiveLog' window is visible on the right side of the Queue view, showing 'Queue ID: 626'.

Test Suites Management View

General		Latest execution		Audit Values	
Name ↑	Description	Successful/Total Executions	Created On	Created By	
testSuite01			11.09.2023 13:02:14	MOKLEIN@MT-AG.COM	
testTestSuite		1/2	10.01.2024 08:07:19	FNEUREITER@MT-AG.COM	
testtestTestSuites		0/1	11.01.2024 12:24:30	FNEUREITER@MT-AG.COM	

Queue Management View

General		Execution				Audit Values			
Actions	Execution Name	Version	Execution Point	Status	Successful/Total Cases	(min)	Output Log	Created By	Created On
	testTestSuite - Test switch Step - PLA...	#24	28.02.24 11:48	🕒				LCT	27.02.2024 11:49:50.36
	testTestSuite - Test checkforError Ste...	#20	27.02.24 11:49	📄	4/4	00:26	👁	LCT	27.02.2024 11:49:09.77
	testTestSuite - Test switch Step - PLA...	#24	27.02.24 11:48	📄	0/1	00:13	👁	LCT	26.02.2024 11:49:38.21
	testTestSuite - Test checkforError Ste...	#20	26.02.24 11:48	📄	4/4	00:25	👁	LCT	26.02.2024 11:48:57.88
	testTestSuite - Test switch Step - PLA...	#24	26.02.24 11:48	📄	0/1	00:14	👁	LCT	25.02.2024 11:50:30.33
	testTestSuite - Test checkforError Ste...	#20	25.02.24 11:49	📄	3/4	00:48	👁	LCT	25.02.2024 11:49:27.34

LiveLog - Queue ID: 626

Lessons learned (in the field)

Lessons learned

- No one has time to test!
- Users have different backgrounds/levels of knowledge
- Management view is very important
- Not every customer has the latest version of APEX
- Following and knowledge of Best Practices
- Features based on users need

„Bedarfsanforderung“ – Requirement requests

The screenshot shows the 'Anforderung anlegen' (Create Request) form. The left sidebar contains 'Home', 'Meine Anforderungen' (0), and 'Produktkatalog'. The main content area has a header 'Anforderung anlegen' and a 'Zur Anforderungsübersicht' button. Below is a 'Kopfdaten' section with a 'Begründung' text area and a dropdown for 'An welche Adresse? *' with options 'MT STANDORT' and 'PRIVATE ADRESSE'. At the bottom, there are input fields for 'Straße' and 'Hausnummer'.

The screenshot shows the 'Artikeldetails' (Article Details) page. The left sidebar is the same as the previous screenshot. The main content area has a header 'Artikeldetails' and a 'Zurück' button. Below is a 'Genehmigungen Workflow' section with three steps: 'Angelegt' (created), 'Eingereicht' (submitted), and 'Verwaltung' (administration). To the right is a table with details for the request.

Begründung	Neuer Laptop, da der aktuelle nicht ordnungsgemäß funktioniert
Artikeltyp	Laptop
Bezeichnung	Lenovo ThinkPad T14s R7
Beschreibung	14" WUXGA (FullHD) R7-6850U Pro 32GB/1TB LTE
URL	
Lieferdatum	25.02.2022
Lieferort	Standort Ratingen

„Bedarfsanforderung“ – Lessons learned

- 70 + Cases
- -> each with an average of 30 steps (ranging from 8 to 83)
- Huge Application -> Time saving steps make a huge difference (e.g. Interactive Grid)
- Static Ids are your best friend!
- Good knowledge of application makes testing easier
- Regression tests make releases to production much easier

Lessons learned (in the field)

„Bedarfsanforderung“ – Cases

The screenshot displays a software interface for managing cases. At the top, it shows the worksheet name 'Bedarfsanforderung - DEV', application ID '126', updated by 'MVONRHEIN', and updated on '03.03.2023'. There are buttons for 'Worksheet Variables', 'Worksheet Files', 'Edit Worksheet', and 'Run Worksheet'.

The main section is titled 'Cases' and contains a table with the following data:

Case Name	Description	Sort Order
Seite 1 - Anforderung anlegen - MT Standort - Allgemeinbedarf - Erfolgreich	Eine Anforderung sollte als Allgemeinbedarf gekenn...	360

Below the cases table, there is a 'Steps' section. It includes a search bar, 'Go', 'Actions', 'Edit', 'Save', '+ Add Step', 'Copy', 'Add Steps via Template', 'Move Up', 'Move Down', and 'Resequence Steps' buttons.

The steps table has the following columns: Edit, Sequence, Type, Name, and Enabled.

Edit	Sequence	Type	Name	Enabled
	10	📍	Navigate to Login Page	Yes
	20	📄	Fillout Username - Verwaltungsmitarbeiter	Yes
	30	👉	Click Login Button	Yes
	40	👁	Wait for Navigation Success	Yes
	50	📍	Navigate to "Artikel erstellen"	Yes
	60	👁	Wait for Navigation Success	Yes
	70	📄	Fill Begründung	Yes
	80	👉	Set Adresstype - MT Standort	Yes
	90	📄	Select Lieferort - Testhausen	Yes
	100	👉	Click "Allgemeinbedarf"	Yes
	110	👉	Click "Anforderung anlegen"	Yes
	120	👁	Check creation successful	Yes
	130	👉	Click "Artikel hinzufügen"	Yes
	140	👁	Wait for Navigation Success	Yes
	150	↔	Switch to Type-Select	Yes
	160	👉	Click "Produkttypen des MTZ"	Yes

„Bedarfsanforderung“ – Output Log

The screenshot displays the LCT - Low Code Testing interface. On the left is a navigation sidebar with options: Worksheets, Queue, Import/Export, Test Suites, and Administration. The main area is titled "Output Log" and shows a list of test results. The results are as follows:

Result	Test Case Name	App ID	Execution Time (s)	Error
Success	Landing Page - Login - Erfolgreich	126	2.63	
Success	Landing Page - Login - Fehlerhaft	126	1.3	
Failure	Seite 1 - Anforderung anlegen - MT Standort - Erfolgreich	126	2.27	Error at 14: Check for Navigation Success
Failure	Seite 1 - Anforderung anlegen - MT Standort - Erfolgreich (Retry 1)	126	2.65	Error at 14: Check for Navigation Success
Failure	Seite 1 - Anforderung anlegen - MT Standort - Erfolgreich (Retry 2)	126	2.39	Error at 14: Check for Navigation Success
Failure	Seite 1 - Anforderung anlegen - MT Standort - Allgemeinbedarf - Erfolgreich	126	2.46	Error at 15: Check for Navigation Success
Failure	Seite 1 - Anforderung anlegen - MT Standort - Allgemeinbedarf - Erfolgreich (Retry 1)	126	2.62	Error at 15: Check for Navigation Success
Failure	Seite 1 - Anforderung anlegen - MT Standort - Allgemeinbedarf - Erfolgreich (Retry 2)	126	2.4	Error at 15: Check for Navigation Success
Success	Seite 1 - Anforderung anlegen - MT Standort - Allgemeinbedarf - Error	126	1.6	
Success	Seite 1 - Anforderung anlegen - MT Standort - Keine Begründung - Error			

A detailed view of a failed test case is shown on the right, titled "Seite 1 - Anforderung anlegen - MT Standort - Erfolgreich". It includes a "Case" dropdown, a "Try" button, and a "Clear Filter" button. Below this, there are two screenshots of the application interface, both labeled "test-failed-1.png". The first screenshot shows a "Retry 1" button. The right side of the interface shows a table with columns for "Created On" and "Reset".

„Bedarfsanforderung“ – Output Log

The screenshot displays the LCT - Low Code Testing interface. On the left is a navigation sidebar with options: Worksheets, Queue, Import/Export, Test Suites, and Administration. The main area is titled "Output Log" and shows test results for "Seite 1 - Anforderung anlegen - MT Standort - Menge falsch - Error".

Test Case Summary:
App ID: 126 Execution Time (s): 4.83

Full Trace:

- 1: GET - apex-entw (115ms)
- 2: Navigate to Login Page (711ms)
- 3: Fillout Username - User (31ms)
- 4: Click Login Button (44ms)
- 5: Check for Navigation Success (313ms)
- 6: Navigate to Artikel bestellen (218ms)
- 7: Check for Navigation Success (51ms)
- 8: Fill Begründung (10ms)
- 9: Check Option - MT Standort (6ms)
- 10: Select Lieferort - Testhausen (10ms)
- 11: Click - Anforderung anlegen (48ms)
- 12: Check for creation successful (461ms)
- 13: Click - Artikel hinzufügen (62ms)
- 14: Check for Navigation Success (131ms)
- 15: Switch to Type-Select (0ms)
- 16: Check Option - Standard Option (102ms)
- 17: fill Search-Bar (270ms)
- 18: press "Enter" (19ms)
- 19: Look for Article (112ms)
- 20: Click Article (53ms)
- 21: Switch Back to Page (0ms)
- 22: Check for Successfully added Artikel (507ms)
- 23: Click - Bearbeiten (30ms)
- 24: Click on Interactive Grid - Menge (115ms)
- 25: fill Interactive Grid - Menge (25ms)
- 26: Click on Interactive Grid - Artikeltyp (Unfocus Menge) (96ms)
- 27: Click - Änderungen speichern (43ms)
- 28: Check for errors on the current page (594ms)
- 29: (124ms)
- 30: Click on Interactive Grid - Menge (97ms)
- 31: fill Interactive Grid - Menge - a (21ms)

Two screenshots of the application are shown, both labeled "Case_8.png" and "Case_8_1.png". They display an error message in German: "Anforderung kann nicht eingereicht werden. Die Information und/oder die Bestellung ist bereits existiert oder die Bestellung ist 'Die Bestellmenge ist falsch' angegeben."

On the right side of the interface, there is a table with the following columns: "Created On" and "Reset". The table contains a list of timestamps:

Created On
05.03.2024 17:27:33.24
05.03.2024 17:27:14.69
05.03.2024 17:26:45.21
05.03.2024 16:57:25.69
05.03.2024 16:57:11.11
05.03.2024 16:56:33.85
05.03.2024 16:52:13.26
05.03.2024 16:51:55.75
05.03.2024 16:51:39.02
05.03.2024 16:51:23.90
05.03.2024 16:45:58.60
05.03.2024 16:45:41.21
05.03.2024 16:45:25.73

„Bedarfsanforderung“ – Lessons learned

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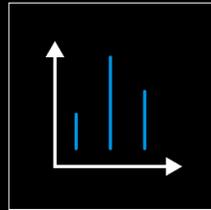
5

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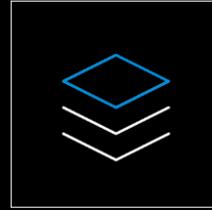
Future Plans and Enhancements



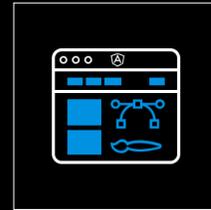
REST endpoints
for jira, git, etc.



Test coverage
statistics



Step Groups/
Templates



UI
enhancements

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Questions?

Questions?



Fabian Neureiter

Say Hy_



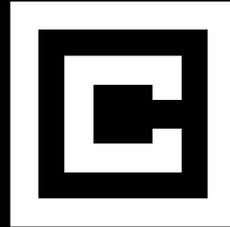
✉ kai.donato@hyand.com

🐦 @_KaiDonato



✉ lynnari.lenffer@hyand.com

🐦 @lynninafaerie



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