Examples of how to test different sites and apps, including the test heuristics applied, tool ideas and more.

HOW CAN I TEST THIS?

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Examples of how to test different sites and apps, along with the test heuristics applied, the reasoning and tool ideas.

Nicola Lindgren, Mike Harris, Suman Bala, Philip Wong and Shawn Shaligram

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Contents

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We would also like to thank the authors of the heuristics mentioned in this book, who all provided such useful resources in doing so.

Good to Know

Different Authors per Chapter

Each chapter is written by a different software tester. This means you'll notice various tones throughout the book, depending on which (and therefore whose) chapter you are reading.

While we did aim for consistency in terms of subheadings, we wanted to give each co-author enough freedom to express themselves - this meant that we didn't try to make all of the chapters "sound" the same.

Not an Exhaustive List of Things to Test

It is important to remember that this book doesn't seek to serve as an exhaustive list of things to test.

For example: In *How Can I Test Sign-in For an E-commerce Website?*: , there *will* be some test ideas missing in this book, that can be applied to a login feature.

Instead, this book seeks to serve as an inspiration, to help trigger new test ideas. This could be for something that is very similar to the example or something completely unrelated.

Test Ideas Can Be Executed by a Machine or a Human

Keep in mind that any test ideas can be executed by a machine or a human - it's up to you. If you plan to write test automation to test these things, just make sure you have the appropriate checks in place.

Useful Definitions

Here are some useful definitions to help you read this book.

Source: Amplitude[1]

Common Data Types

Integer (int)

The most common numeric data type used to store numbers without a fractional component e.g. -30, 0, 22

Floating Point (float)

Also a numeric data type used to store numbers that may have a fractional component e.g. -30, 0, 22, 22.5, 22.75

Please note that number is often used as a data type that includes both int and float types.

Character (char)

Used to store a single letter, digit, punctuation mark, symbol, or blank space.

String (str or text)

[1] https://amplitude.com/blog/data-types

A sequence of characters and the most commonly used data type to store text. This data type can also include digits and symbols, however, it is always treated as text.

A phone number is usually stored as a string (+1-222-333-4444) but can also be stored as an integer (222333444).

Boolean (bool)

It represents the values true and false. When working with the boolean data type, keep in mind that sometimes a boolean value is also
represented as 0 (for false) and 1 (for true).

Enumerated type (enum)

It contains a small set of predefined unique values (also known as elements or enumerators) that can be compared and assigned to a variable of enumerated data type.

The values of an enumerated type can be text-based or numerical.

With enumerated type, values can be stored and retrieved as numeric indices (0, 1, 2) or strings.

Array

Also known as a list, an array is a data type that stores a number of elements in a specific order, typically all of the same type.

Since an array stores multiple elements or values, the structure of data stored by an array is referred to as an array data structure.

Each element of an array can be retrieved using an integer index (0, 1,
2,...), and the total number of elements in an array represents the length of an array.

Date

Typically stores a date in the YYYY-MM-DD format (ISO 8601 syntax).

Time

Stores a time in the hh:mm:ss format. Besides the time of the day, it can also be used to store the time elapsed or the time interval between
two events which could be more than 24 hours.

Datetime

Stores a value containing both date and time together in the YYYY-MM-DD hh:mm:ss format.

Timestamp

Typically represented in Unix time[2], a timestamp represents the number of seconds that have elapsed since midnight (00:00:00 UTC), 1st January 1970.

REST API

According to IBM:[3]

"An API, or application programming interface, is a set of rules that define how applications or devices can connect to and communicate with
each other. A REST API is an API that conforms to the design principles
of the REST, or representational state transfer architectural style. For
this reason, REST APIs are sometimes referred to as RESTful APIs."

"REST APIs provide a flexible, lightweight way to integrate
applications, and have emerged as the most common method for connecting
components in microservices architectures."

[2] https://en.wikipedia.org/wiki/Unix_time
[3] https://www.ibm.com/cloud/learn/rest-apis

How To Read This Book

This book puts examples at the forefront and uses them to explain how you can test different test targets.

Each chapter is centred around a different example and will have roughly the same structure:

- Set the Scene (General Context)
- Product Context (Assumptions)
- Questions
- Challenges Around Testing This (if any)
- How I Would Limit Scope (and why)
- Which Test Heuristics I Would Apply
- Additional Test Ideas / Test Ideas
- Tools/Other Resources

Here is an outline of what each section will include:

Set the Scene (General Context)

Here, we provide some context around the test target and any development or testing processes that already exist. This provides overall context that the reader should know, that isn't specific to the test target.

Product Context (Assumptions)

This provides context around the test environment as well as the test target itself.

Questions

These are questions that we may put forward to the product team when we are testing it. These questions can also help you, the reader, come up with additional questions when testing similar features/sites etc.

Challenges Around Testing This (if any)

These are what would make testing this test target difficult. Another way of looking at this would be:

What to Watch Out For

This subchapter won't necessarily be present in every chapter.

How I Would Limit Scope (and why)

You can't (and shouldn't try to) test everything.

In this section, we explain how we would limit scope and our reasoning behind it.

Which Test Heuristics to Use

In this section, we offer a set of heuristics that would be helpful for our testing. But what exactly are heuristics?

"Heuristics are principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations."

Source: Judgment under Uncertainty: Heuristics and Biases by Amos Tversky and Daniel Kahneman.

But there is a simpler way of looking at it. Have a look at this alternative definition below:

"A heuristic is a mental shortcut that allows people to solve problems and make judgments quickly and efficiently. These rule-of-thumb strategies shorten decision-making time and allow people to function without constantly stopping to think about their next course of action."

Source: Verywell Mind[4]

Additional Test ideas / Test Ideas

If there are tests that we would want to run to test this feature/site/app, and we can't clearly link it to a heuristic we know, then they would go into this section.

These would include ideas that come from our, the authors', experience and our intuition.

This subchapter won't necessarily be present in every chapter.

Tools/Other Resources

This is a list of tools and/or other resources we would use to test this.

We would also include links to read up on those tools and at times, an explanation of how these tools could be utilised to test this feature.

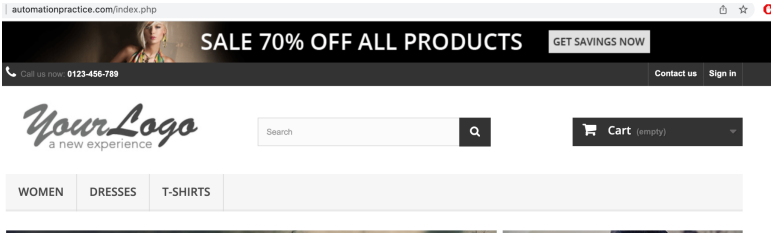
[4] https://www.verywellmind.com/what-is-a-heuristic-2795235

Chapter 1: How Can I Test Sign-in for an E-commerce Site?

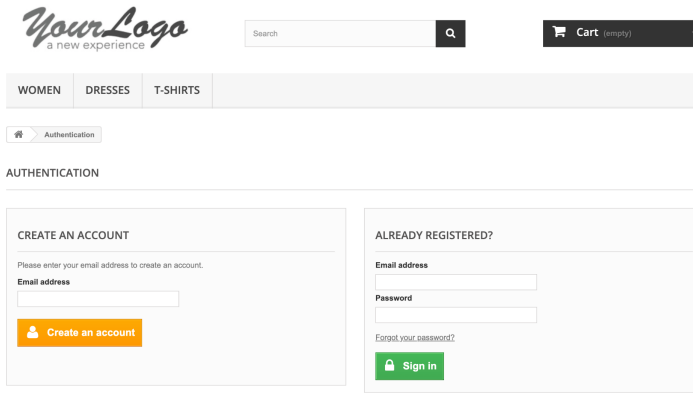
By Nicola Lindgren

Set the Scene

An E-Commerce Site that sells clothes in New Zealand and ships only within New Zealand.



The Homepage



The Authentication page

What's happening?

- The e-Commerce site is currently being built and not in production yet.
- This login functionality is being added for v1.0 of this site.
- You are part of a new cross-functional team focussed on the Login functionality.
- We have a team for each product area. (i.e. A team for registration functionality, a team for checkout, a team for Product listings etc.)

Designs

- We get a copy of the login popup design and the registration page design. But no requirements are written for the login screen as the Product Owner assumes it is self-explanatory.
- We aren't given any designs for the "reset password" functionality, nor do we have access to any other designs.

Other

- Set-up will be needed, you'll need to create user profiles first before being able to test login.
- The registration functionality has already been built. Up until now, your team has been able to use this registration functionality in your test environment.
- You will also need to be able to delete user accounts to make sure those users can no longer log in.
- Rules around an acceptable password were already set and implemented by the 'Registration functionality' team.

Product Context

Email and password fields

- As the password is entered, it'll either show as dots or asterisks, it will NOT show what I enter, except for on mobile, where the last character is shown.
- The login page design doesn't currently indicate that you can "show password" - you may want to ask about this, for better accessibility. (It can be difficult for some people to remember what password they just entered).
- Email must be in test@example.com format for "valid input" to have been put into this field (a@b.c would also be accepted).
- Password must have met the minimum character limit, eight characters, before we consider that "valid input"
- Both the email and password fields must have valid input for the 'Sign in' button to be enabled.
- The maximum character validation is done in the front end so I can't input more than the maximum number of characters in each field.

Other

- A generic message will appear if the user wants to reset the password (we don't want a message saying there is definitely an account with this email whyhellothere@example.com). We want it to be more generic because it would be a security risk if we explicitly tell the user there is definitely an account associated with an email address. With this information, a hacker may now know this is an account they can try and hack. It would be more appropriate to show a message like: *"If there is an account associated with hello@example.com, then an email has been sent to reset the password".*
- Your login information will be encrypted because PII (Personally Identifiable Information) needs to be encrypted. Aside from an email address and password, PII can also include Credit Card number, first name, last name, phone number etc. By "encryption" we mean that the information being sent will not be readable by a human.
- You cannot be logged in to more than one device at once.
- If you have been adding items to the cart, as a guest, and then you log in, the things in my cart will still be there (i.e. my cart will *not* be cleared).
- If you have been adding items to the cart, as a logged-in user, and then you log out, the cart will be cleared.

Questions

Email and password fields

- What is the maximum character limit (for both the UI and the API) for the email address and password fields?
- Is there a minimum character limit we should be aware of for the email address and password fields?
- Is there an allowed-list of characters for either of the fields?
- What password rules do we have set?

Getting locked out

- Will we have a limit of login attempts for an account before we lock it? If so, how long do we lock it?
- If a user gets locked out, what will the user see? Is there a way for the user to get past being locked out sooner? (such as contacting customer support)

Reset password

- Is there a limit on how many times "reset password" can be used in a space of time? If so, what is that limit? (We want to know this, to ensure that the login functionality is secure. If there is no limit on the number of login attempts in a given period of time, then someone can try to brute force their way into user accounts.)
- Is there any validation done against your new password, once you reset it? (e.g. It can't be the same as your previous three passwords.)
- Will the reset password link expire after a certain period of time?

Other

- If I have added items to the cart before, on a different device, when I log in, do I expect to see those items now in the cart?
- Will the user be logged out after a certain period of inactivity? If so, when would that be?
- If you try to log in to more than one device at a time, what will you see?

How I Would Limit Scope

Browsers and devices

- For desktop, I would only test on the top four desktop browsers used in New Zealand since this site is a NZ-based E-commerce site that ships only within New Zealand.
- For mobile, I would only test Safari and Chrome on iPhone and the default browser in Android (For example: Samsung devices have 'Internet').
- Test on one older device (at least four years old) and one new (released in the last year) device – If there is nothing explicitly stated regarding which operating systems are supported, then the device age could be used as a proxy (as new OS versions are released, then older devices tend to longer be supported with time).
- Test on a large screen (larger than 6.5 inches/16.5cm and a small screen (smaller than 4.5 inches/11,43cm)

Other

- Since this online store doesn't do overseas delivery, their target audience is in NZ - therefore we will only test in English and in browsers that are the most used in New Zealand.
- No performance testing, but will double check load times if pages appear to take more than 2 seconds to load. We want to focus more on that it works first, before if it works well.
- There will be no security testing as the security specialist in our company is already working on it.

Which Test Heuristics I Would Apply

Heuristic Test Strategy Model by James Bach[5]

Function

- When I click on the 'Create an account' button, it takes me to the 'registration screen'
- I am able to log in with valid data. e.g. nicola@example.com | passwordyay
- Once I click 'Sign In', I stay on the same page, but the 'Sign In' text is replaced with 'Profile'.
- When I click on 'Profile', I see the profile settings dropdown menu including the logout button.

Elisabeth Hendrickson Test Heuristics Cheat Sheet[6]

Input Web Tests and Strings

Tests:

Once you have found out the expected character limits for each field, run the following tests:

- Max character checks, within the character limit: Copy-paste alphanumeric characters equal to the limit onto both fields. Check to see what actually 'made it' into the fields. Also check what actually made it into the database.
- Max character checks, outside the character limit: Copy-paste alphanumeric characters one above the character limit onto both fields. Check to see what actually 'made it' into the fields. I would also check what actually made it into the database.

[5] https://www.satisfice.com/download/heuristic-test-strategy-model
[6] https://testobsessed.com/wp-content/uploads/2011/04/testheuristicscheatsheetv1.pdf

Consistency Heuristics from Michael Bolton's FEW HICCUPPS[7]

Consistency with User Desires

Tests that would fall under this heuristic

- If I have already logged in from this device before, (and I am not in incognito mode and my login data is saved in this browser), then soon as my cursor is in the 'email address' field, I have the option to autocomplete my login details.
- If I have used a password manager (such as LastPass[8]) to log in here before and I am currently logged in to my password manager, once I have my cursor in the email address or 'rewards number' field, I am asked if I want to use my login data from my password manager
- On a desktop, I can tab between fields. I expect tabbing to go like this: username –> password and then hit Enter to be able to log in. (On a phone, it's probably the return key.)

Consistent with Comparable Product

(The comparable product used in this example is Glassons, a NZ fashion retailer[9]).

Tests that would fall under this heuristic:

- When I click on the 'Forgot your password?' hyperlink, a "reset password" screen appears with an email field and a 'reset' button.
- If I enter an email address that has an account and the wrong password, this error message appears: "Incorrect email or password" (Generic error message is shown so that potential attackers don't know which email addresses have an account here. Therefore, it'll be harder to hack an existing account.)

[7] https://www.developsense.com/blog/2012/07/few-hiccupps/
[8] https://www.lastpass.com/
[9] https://www.glassons.com/nz

- If I enter an email address that does not have an account and the wrong password, this error message appears: "Incorrect email or password". (Same reasoning as before.)

Lena Wiberg's - Would Heu-Risk It?[10]

Don't Turn Back (this is about understanding that our users will never use the system in the ways we intended them to.)

Tests:

- After you click on the Sign-in button, click back on the browser.

Constantly Consistent

Tests:

- The password rules for the login page MUST match the password rules for the registration page (e.g. maximum characters).
- The email validation here MUST match the rules already set in the registration page
- If we collect emails elsewhere in the website, the validation rules must be consistent with that as well.
- The action button (the sign-in button) must be consistent with the design of other action buttons in the site.
- Other UI elements for the login functionality must also be consistent with the pre-existing designs throughout the site including fields, error messages etc.
- When I hover my mouse over a button, the 'active' state must show. For this site, the button has a black background with white text.

[10] https://pejgan.se/would-heu-risk-it.html

Additional Test Ideas

These are ones that I think of, that aren't triggered by a specific heuristic:

- Timeouts, I would want to see how the sign-in screen handles a timeout if it happens to lose connection just after you submit your authentication request
- Backend service is misbehaving, I would want to see how the sign-in screen handles such a situation.
- Backend service is misbehaving, I would want to see how the reset password screen handles such a situation.

Tools/Other Resources

- Fake Filler[11] for Profile creation - This tool fills in fields with dummy data. It can help you save time instead of having to manually enter a user's details each time you need to create an account to test with.
- Charles[12] is a web proxy (HTTP Proxy / HTTP Monitor) that will enable you to record and display, to you all of the data that is sent and received. This tool can be particularly useful for mobile testing, when it's more difficult to see the network traffic.
- In the Testing with Charles Proxy blog series,[13], you can read up on how to use Charles Proxy for testing.
- XMind[14] is a mind-mapping software. This can help you visualise your testing and talk about it with your team.

[11] https://fakefiller.com/
[12] https://www.charlesproxy.com/
[13] https://nicolalindgren.com/2022/01/17/testing-with-charles-proxy-part-1/
[14] https://www.xmind.net/

- Chrome Dev Tools[15] - This is a set of web developer tools built directly into the Google Chrome browser.
- A password manager such as LastPass[16] or 1Password.[17]
- Ashley Graf's article 16 Ways Software Testability Can Assist Manual Testing[18] - You can read various tips including granting read-only access to the database and making JSON payloads more readable.

[15] https://developer.chrome.com/docs/devtools/
[16] https://www.lastpass.com/
[17] https://1password.com/
[18] https://dev.to/ashleygraf_/16-ways-software-testability-can-assist-manual-testing-4plf

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Registering manually through the website can be time consuming

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Suman Bala is an award-winning Lead Test Architect with a passion for improvement in quality processes and is a strong believer in Test Automation.

She "live and breathe" holistic approach of testing. She feels proud of how people's perspective has changed regarding testing throughout her career. She is striving to instil the idea that quality is everyone's responsibility as opposed to merely laying it at the feet of QA.

She is a co-organiser for the Ministry of Testing Buckinghamshire meet-up. She is a mentor and coach at work and within the wider testing community. She has contributed to the e-book Testing Stories[19] on breadth and depth of testing skills.

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[22] https://www.geckoboard.com/

Tester and a Test Lead. He has also worked as a part of waterfall, lean and agile teams.

Mike has a B.Sc.(HONS) from Middlesex University and is an Associate of the University of Hertfordshire. He has set up and led a Testing Community of Practice and been part of a successful agile transition. He is also Programme Secretary of the British Computer Society's Specialist Interest Group in Software Testing.

He also contributed to the e-book Testing Stories[23] and has had articles published by the Ministry of Testing and The QA Lead.

In his spare time he coaches his daughters cricket team

Mike has a blog at http://testandanalysis.home.blog/[24] and you can follow him on Twitter at @TestandAnalysis[25]

Nicola Lindgren

Nicola Lindgren is a Senior QA Engineer/ QA Manager, based in Malmö, Sweden. She is the author of Starting Your Software Testing Career[26] and an international conference speaker.

She has worked on projects in a wide range of industries including Trade, Education, Payments, e-Commerce, Transport and Gaming. She has worked in Agile (Scrum, Kanban), Continuous Delivery and Waterfall environments, in both co-located and distributed teams.

Nicola started two testing meetups (one in Auckland, New Zealand and one in Stockholm, Sweden), has taught software testing courses and run workshops, coached and mentored multiple testers and written for various testing publications. She has also been a co-instructor for the BBST Foundations course multiple times.

[23] https://leanpub.com/testing_stories/
[24] https://testandanalysis.home.blog/
[25] https://twitter.com/TestAndAnalysis
[26] https://leanpub.com/startinginsoftwaretesting

You can find Nicola on Twitter at @NicolaLindgren[27] or LinkedIn[28]

She blogs about testing, automation, personal development and agile at nicolalindgren.com[29].

Shawn Shaligram

Shawn Shaligram is a Staff Test Engineer/Manager, based in San Francisco, California. He has been a member of an agile team, a Solo Tester and an ICM leading a team of 3 testers and SDETs working primarily on mobile apps.

He has also contributed to the e-book Starting Your Software Testing Career.[30]

In his spare time he plays a lot of cricket and tennis.

LinkedIn - Shawn Shaligram[31]

Twitter - Shawn Shaligram @shatelgram[32]

Phil Wong

Phil Wong is an ordinary tester who is based in the UK. At the point this book was released, he has managed to keep this job title for about 1308 days. The first job he took on was a job board (hint), but now he has leveled up to testing mobile apps (secret project).

His day to day means wielding an iPhone and iPad in one hand, Android Tablet and Phone in the other. You can connect with this man of few words on LinkedIn.[33]

[27] https://twitter.com/NicolaLindgren
[28] https://www.linkedin.com/in/nicolalindgren/
[29] https://nicolalindgren.com/
[30] (https://leanpub.com/startinginsoftwaretesting)
[31] https://www.linkedin.com/in/shawn-shaligram/
[32] https://twitter.com/shatelegram
[33] https://www.linkedin.com/in/philipw1/