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Exercise 4

To fulfill Exercise 4, we chose the domain hotel booking.

We wrote two wrappers: extracting data from **expedia.de** using ***import.io*** and extracting data from **de.hotels.com** using ***Mozenda***.

First we show the process of extracting data:

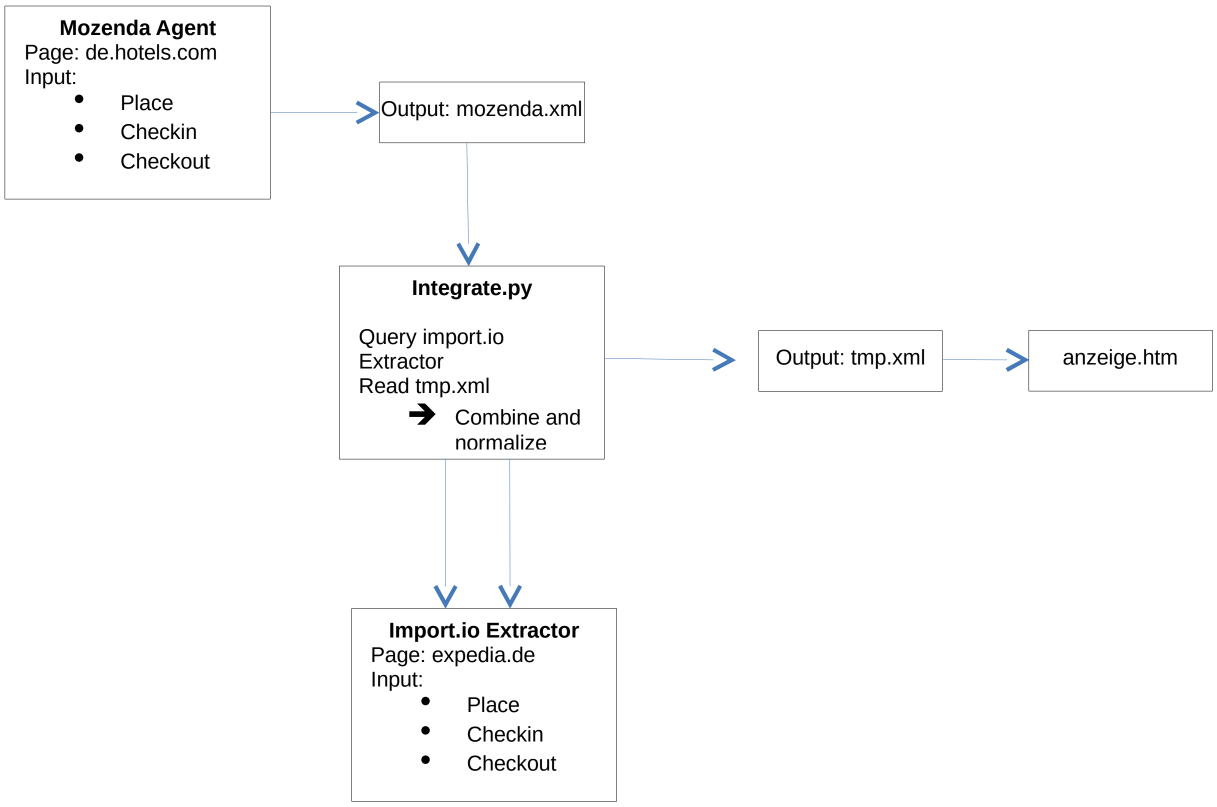


Fig 1: Process of wrapping data from two sources. First, the Mozenda Agent runs manually (because the REST API is not available). Then data are exported as XML and stored in mozenda.xml. The python script integrate.py triggers the import.io extractor with provided user input. So links to detail pages are extracted using one import.io extractor, and these links are used with a second extractor to extract detail hotel information as XML. Data from mozenda.xml is read, and data from both sources are normalized and stored in tmp.xml. anzeige.htm reads the file tmp.xml and displays output in a table. If available, images are displayed, if not, just a text is displayed. The color code corresponds to the wrapper source, after moving the mouse over an hotel thumbnail, data extracted from the detail links is displayed.

The output (anzeige.htm) looks as follows:

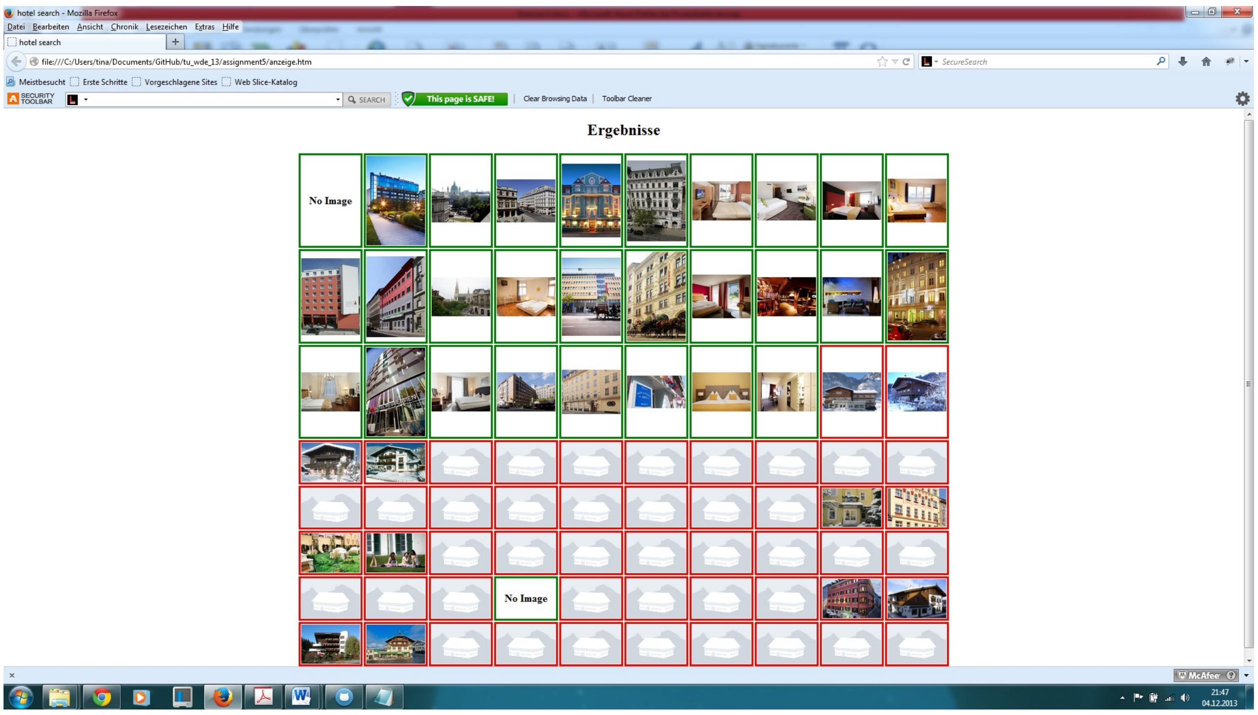
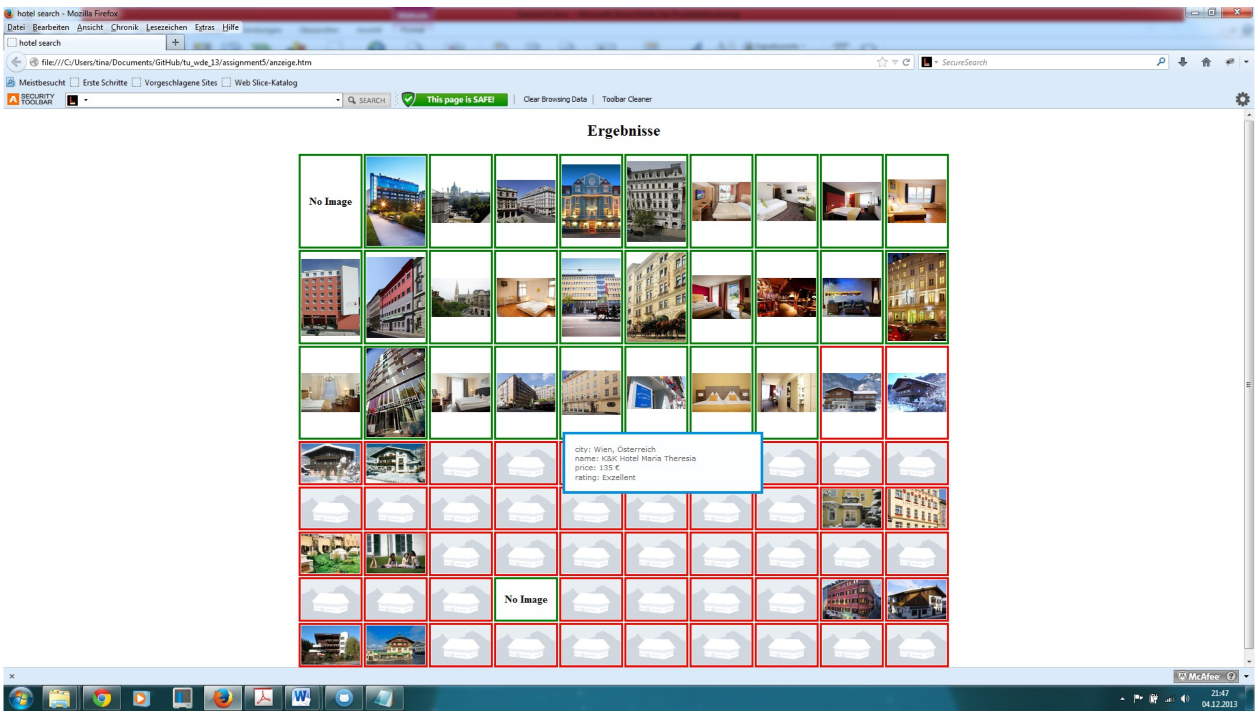

hotel search - Mozilla Firefox
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
hotel search
file:///C:/Users/tina/Documents/GitHub/tu_wde_13/assignment5/anzeige.htm
Meistbesucht
Erste Schritte
Vorgeschlagene Sites
Web Slice-Katalog
This page is SAFE!
Clear Browsing Data
Toolbar Cleaner
Ergebnisse
No Image
No Image

Fig 1: Hotel thumbnails are displayed in a table (if available, otherwise just a text is displayed). A green border corresponds to source mozenda (de.hotels.com), a red border to source import.io (expedia.de).


hotel search - Mozilla Firefox
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
hotel search
file:///C:/Users/tina/Documents/GitHub/tu_wde_13/assignment5/anzeige.htm
Ergebnisse
No Image
No Image

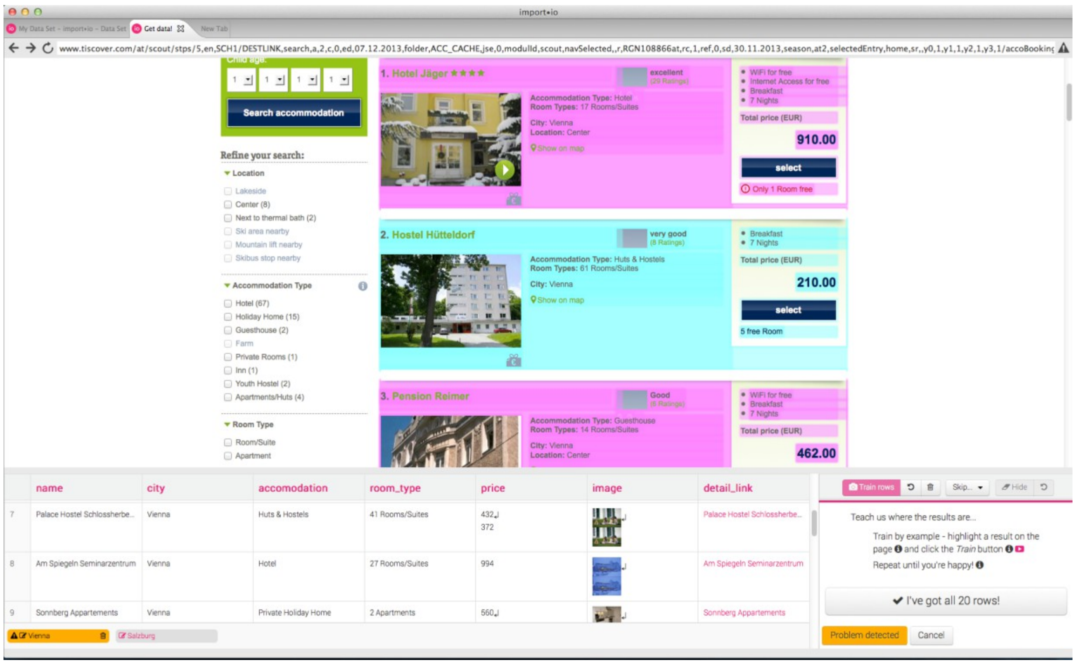
```
city: Wien, Österreich
name: K&K Hotel Maria Theresia
price: 135 €
rating: Exzellent
```

Fig 2: When moving over a hotel thumbnail, information extracted from the detail pages is provided.

Now we provide some information on the used wrappers.

Import.io is a completely web-based builder, very fast to learn, but somehow limited. Pagination should work, you can also train it, but after building the wrapper, it is not carried out. After creating the extractor, we query it using a provided python modul.

Here are screenshots from the work with **import.io**:



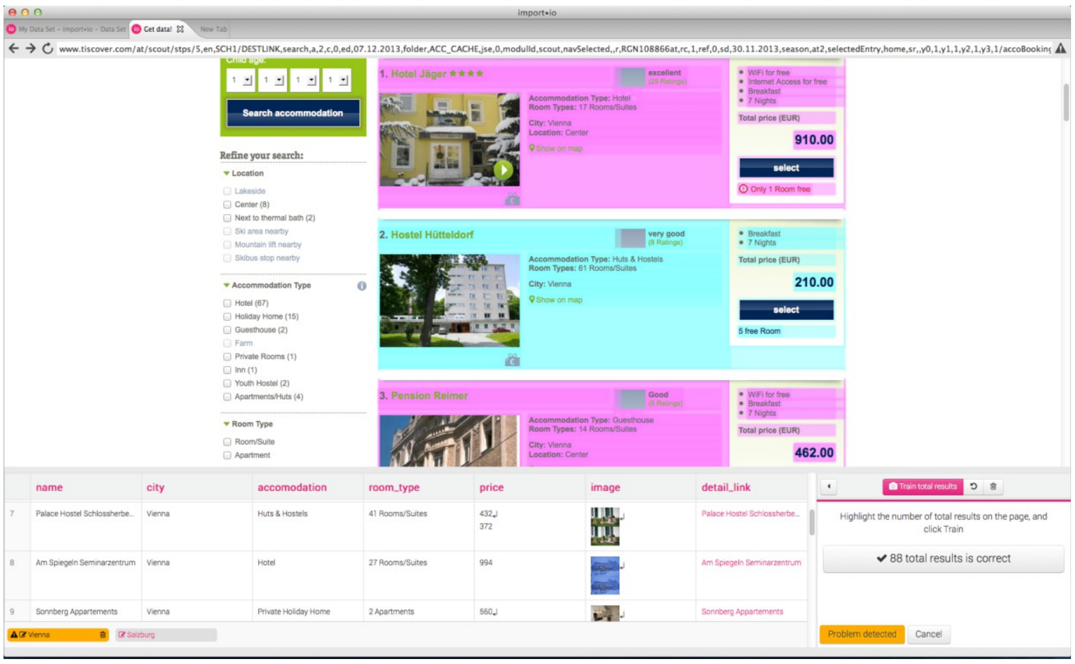
	name	city	accomodation	room_type	price	image	detail_link
7	Palace Hostel Schlossherbe...	Vienna	Huts & Hostels	41 Rooms/Suites	432↲ 372		Palace Hostel Schlossherbe...
8	Am Spiegeln Seminarzentrum	Vienna	Hotel	27 Rooms/Suites	994		Am Spiegeln Seminarzentrum
9	Sonnberg Appartements	Vienna	Private Holiday Home	2 Apartments	560↲		Sonnberg Appartements

Teach us where the results are...

Train by example - highlight a result on the page and click the *Train* button

Repeat until you're happy!

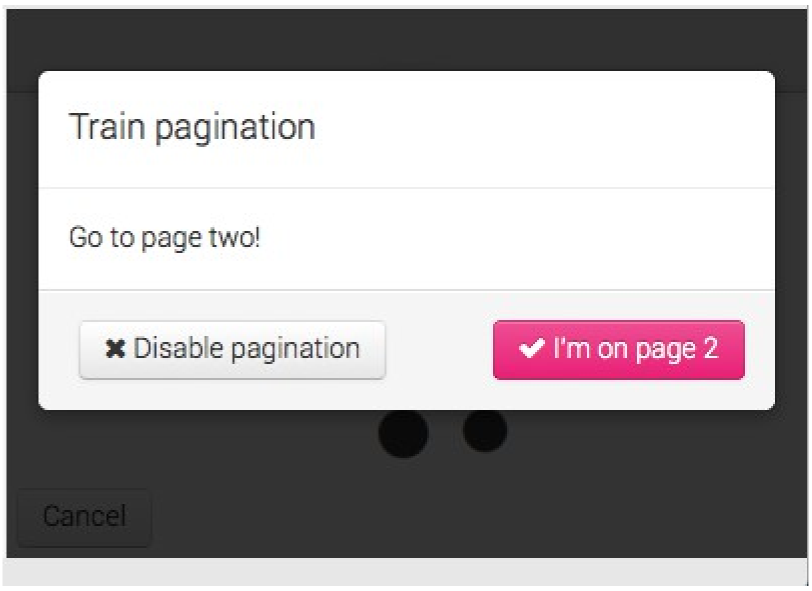
Fig. 4: You always have to choose two to five example objects, so import.io can detect a list of other objects to extract (training the extractor).



	name	city	accomodation	room_type	price	image	detail_link
7	Palace Hostel Schlossherbe...	Vienna	Huts & Hostels	41 Rooms/Suites	432↲ 372		Palace Hostel Schlossherbe...
8	Am Spiegeln Seminarzentrum	Vienna	Hotel	27 Rooms/Suites	994		Am Spiegeln Seminarzentrum
9	Sonnberg Appartements	Vienna	Private Holiday Home	2 Apartments	560↲		Sonnberg Appartements

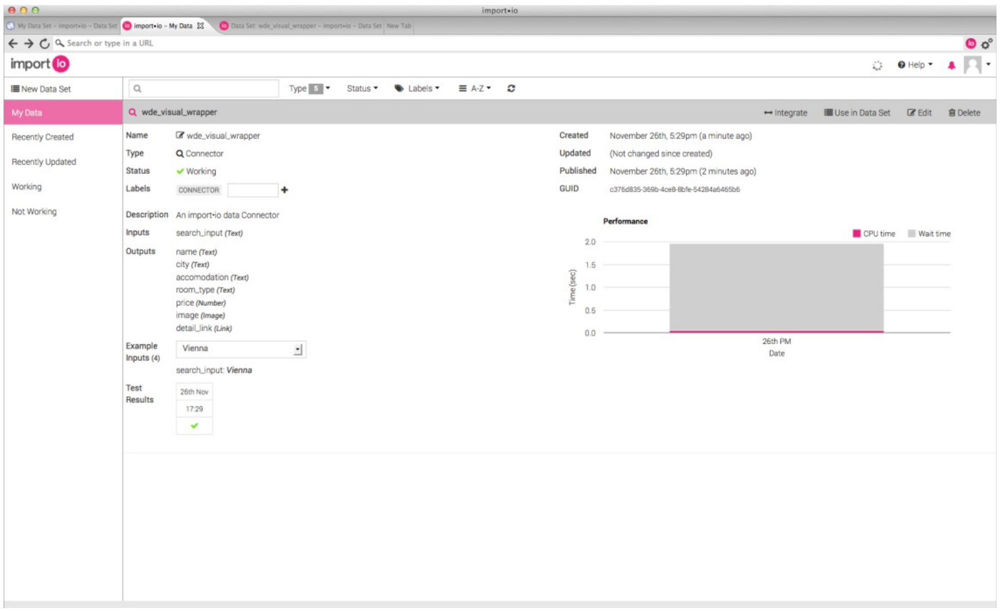
Highlight the number of total results on the page, and click Train

Fig 5: All the captured content is displayed at the bottom for control purpose.


Train pagination

Go to page two!

Fig 6: Import.io should be able to train pagination (following next links), but in fact it doesn't work.



wde_visual_wrapper

Name	wde_visual_wrapper
Type	Connector
Status	✓ Working
Labels	CONNECTOR
Description	An import·io data Connector
Inputs	search_input *(Text)*
Outputs	name *(Text)* city *(Text)* accomodation *(Text)* room_type *(Text)* price *(Number)* image *(Image)* detail_link *(Link)*
Example Inputs (4)	Vienna search_input: *Vienna*
Test Results	26th Nov 17:29 ✓

Created	November 26th, 5:29pm (a minute ago)
Updated	(Not changed since created)
Published	November 26th, 5:29pm (2 minutes ago)
GUID	c376d835-369b-4ce8-8bfe-54284a6465b6

Fig 7: After creating the wrapper, it is stored online and can be queried.

Mozenda is a very easy and intuitive tool for creating web extractors. You have to download a software called AgentBuilder, to build and test your agents locally. After creating an extractor, you upload it tot he mozenda server, where it can be run (you can define schedules and query data using the REST API, but it is not available in the trial version). The agent itself is clearly structured, the actions are shown on the left bottom, jumps to other steps (linke pagination or following detail links) are illustrated by numbers, and details about every action is displayed in the left upper side.

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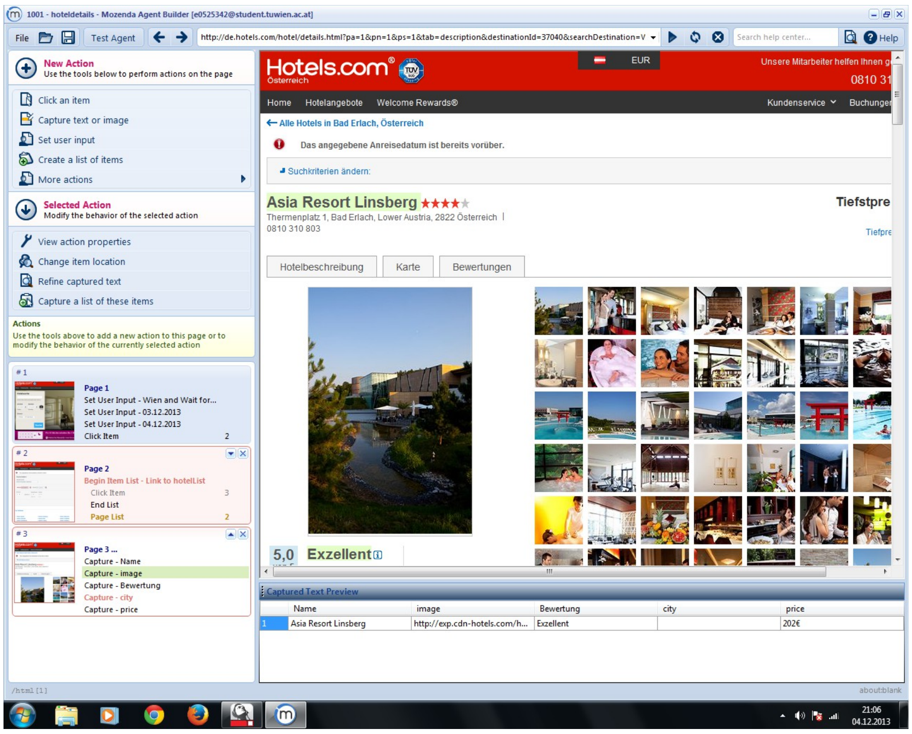
Here are screenshots from working with **Mozenda:**



	Name	image	Bewertung	city	price
1	Asia Resort Linsberg	http://exp.cdn-hotels.com/h...	Exzellent		202€

Fig 8: Mozenda is very clearly structured and intuitive; Results are displayed immediately

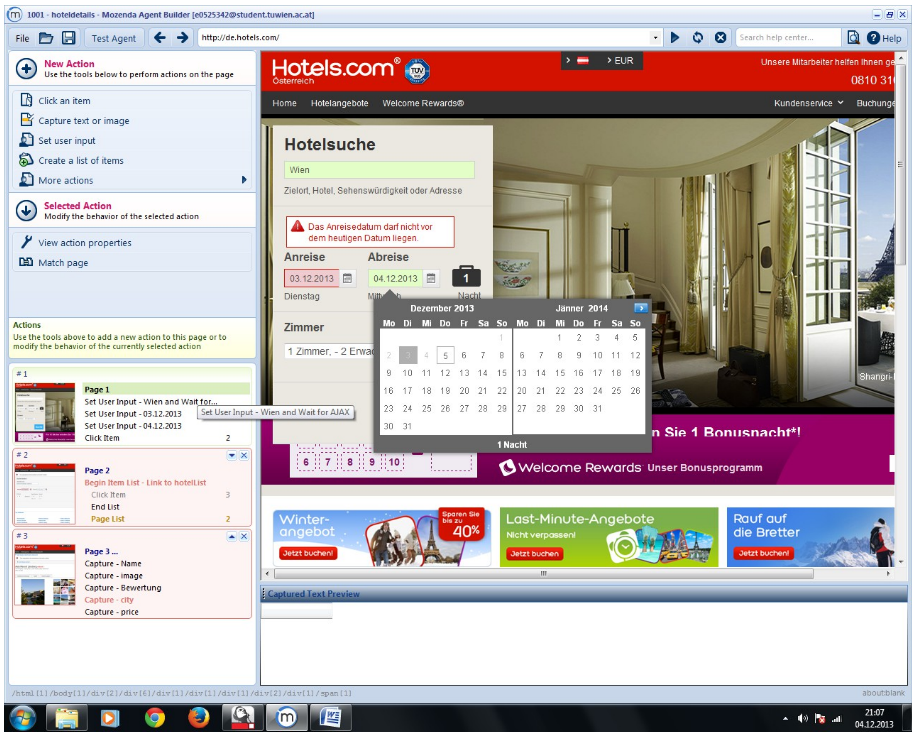
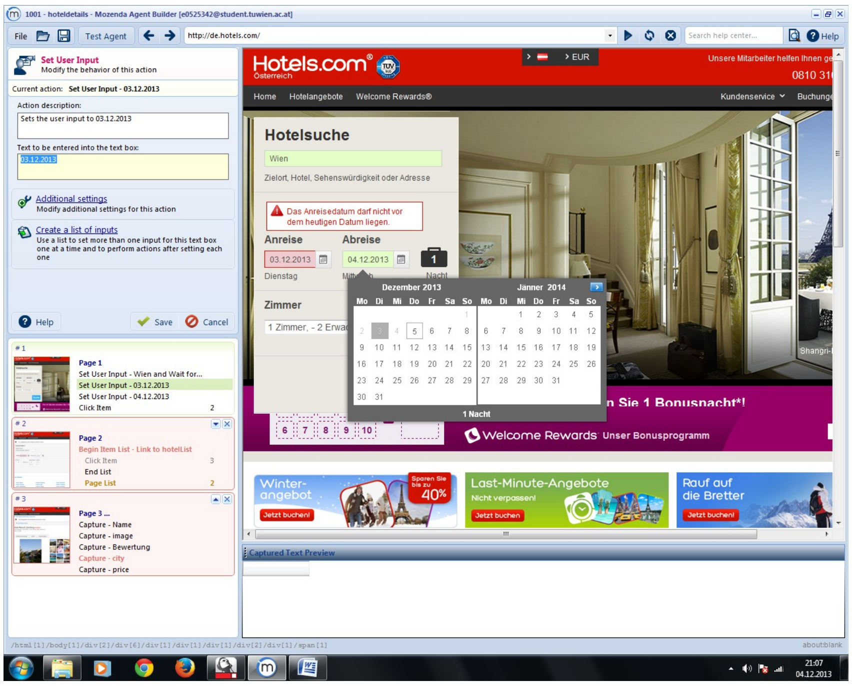

1001 - hoteldetails - Mozenda Agent Builder [e0525342@student.tuwien.ac.at]
New Action
Click an item
Capture text or image
Set user input
Create a list of items
More actions
Selected Action
View action properties
Match page
Set User Input - Wien and Wait for AJAX
Hotelsuche
Das Anreisedatum darf nicht vor dem heutigen Datum liegen.
Captured Text Preview

Fig 9: on the left side, you can see the sequence of actions carried out, also the jumps to different steps (like following next or detail links)


Set User Input
Modify the behavior of this action

Current action: Set User Input - 03.12.2013

Action description:
Sets the user input to 03.12.2013

Text to be entered into the text box:
03.12.2013

Additional settings
Modify additional settings for this action

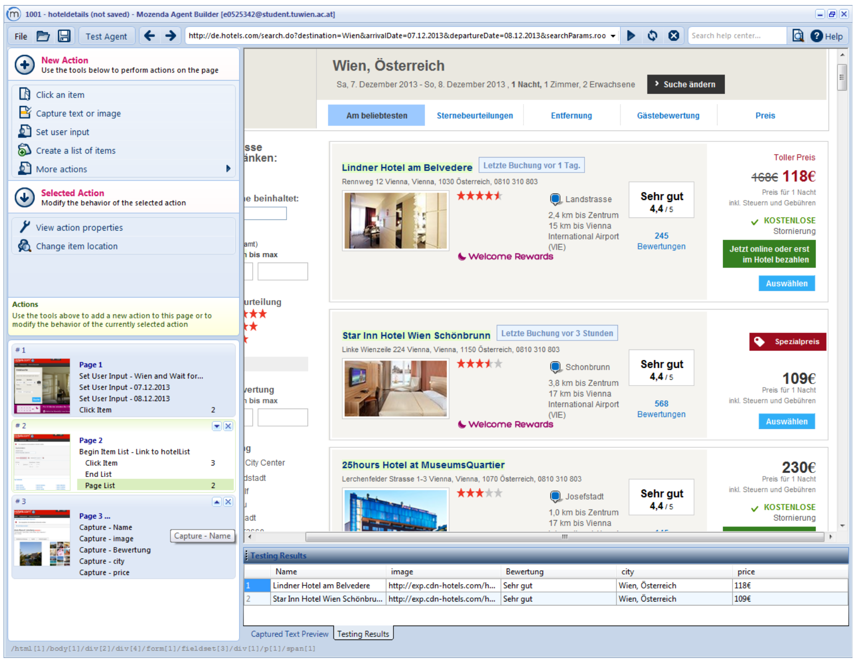
Create a list of inputs
Use a list to set more than one input for this text box one at a time and to perform actions after setting each one

#1
Page 1
Set User Input - Wien and Wait for...
Set User Input - 03.12.2013
Set User Input - 04.12.2013
Click Item 2

#2
Page 2
Begin Item List - Link to hotelList
Click Item 3
End List
Page List 2

#3
Page 3 ...
Capture - Name
Capture - image
Capture - Bewertung
Capture - city
Capture - price

Fig 10: On the left upper site you can define user inputs for input variables


New Action
Use the tools below to perform actions on the page

Click an item
Capture text or image
Set user input
Create a list of items
More actions

Selected Action
Modify the behavior of the selected action

View action properties
Change item location

Actions
Use the tools above to add a new action to this page or to modify the behavior of the currently selected action

#1
Page 1
Set User Input - Wien and Wait for...
Set User Input - 07.12.2013
Set User Input - 08.12.2013
Click Item 2

#2
Page 2
Begin Item List - Link to hotelList
Click Item 3
End List
Page List 2

#3
Page 3 ...
Capture - Name
Capture - image
Capture - Bewertung
Capture - city
Capture - price

Testing Results

	Name	image	Bewertung	city	price
1	Lindner Hotel am Belvedere	http://exp.cdn-hotels.com/h...	Sehr gut	Wien, Österreich	118€
2	Star Inn Hotel Wien Schönbru...	http://exp.cdn-hotels.com/h...	Sehr gut	Wien, Österreich	109€

Fig 11: After building the agent, you can test it locally.Results are displayed at the bottom oft he software.

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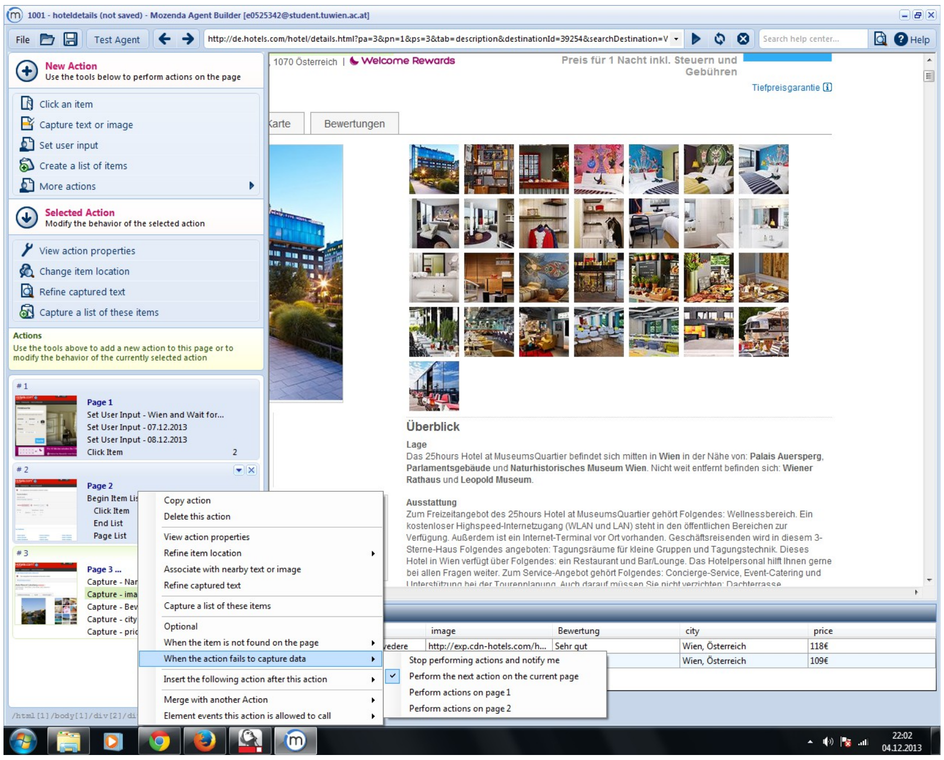

1001 - hoteldetails (not saved) - Mozenda Agent Builder [e0525342@student.tuwien.ac.at]
File
Test Agent
Help
New Action
Use the tools below to perform actions on the page
Click an item
Capture text or image
Set user input
Create a list of items
More actions
Selected Action
Modify the behavior of the selected action
View action properties
Change item location
Refine captured text
Capture a list of these items
Copy action
Delete this action
View action properties
Refine item location
Associate with nearby text or image
Refine captured text
Capture a list of these items
Optional
When the item is not found on the page
When the action fails to capture data
Insert the following action after this action
Merge with another Action
Element events this action is allowed to call
Stop performing actions and notify me
Perform the next action on the current page
Perform actions on page 1
Perform actions on page 2
Welcome Rewards
Karte
Bewertungen

Actions
Use the tools above to add a new action to this page or to modify the behavior of the currently selected action

Page 1
Set User Input - Wien and Wait for...
Set User Input - 07.12.2013
Set User Input - 08.12.2013
Click Item

Page 2
Begin Item List
Click Item
End List
Page List

Page 3 ...

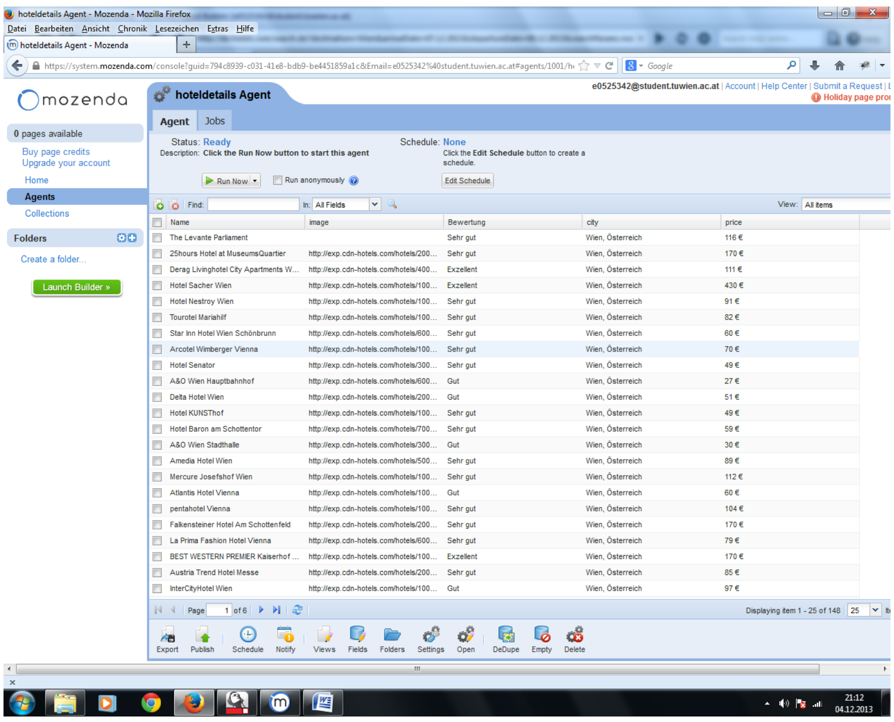
Überblick

Lage
Das 25hours Hotel at MuseumsQuartier befindet sich mitten in **Wien** in der Nähe von: **Palais Auersperg**, **Parlamentsgebäude** und **Naturhistorisches Museum Wien**. Nicht weit entfernt befinden sich: **Wiener Rathaus** und **Leopold Museum**.

Ausstattung
Zum Freizeitangebot des 25hours Hotel at MuseumsQuartier gehört Folgendes: Wellnessbereich. Ein kostenloser Highspeed-Internetzugang (WLAN und LAN) steht in den öffentlichen Bereichen zur Verfügung. Außerdem ist ein Internet-Terminal vor Ort vorhanden. Geschäftsreisenden wird in diesem 3-Sterne-Haus Folgendes angeboten: Tagungsräume für kleine Gruppen und Tagungstechnik. Dieses Hotel in Wien verfügt über Folgendes: ein Restaurant und Bar/Lounge. Das Hotelpersonal hilft Ihnen gerne bei allen Fragen weiter. Zum Service-Angebot gehört Folgendes: Concierge-Service, Event-Catering und Unterstützung bei der Tourenplanung. Auch darauf müssen Sie nicht verzichten: Dachterrasse

	image	Bewertung	city	price
vedere	http://exp.cdn-hotels.com/h...	Sehr gut	Wien, Österreich	118€
			Wien, Österreich	109€

Fig 12. If condition: if action fails to capture an image from the detail link, the agent continues with performing the next action on the current ~~page~~.



e0525342@student.tuwien.ac.at | Account | Help Center | Submit a Request

Status: Ready
Description: Click the Run Now button to start this agent

Schedule: None
Click the Edit Schedule button to create a schedule.

Find: In: All Fields View: All items

Name	image	Bewertung	city	price
The Levante Parliament		Sehr gut	Wien, Österreich	116 €
25hours Hotel at MuseumsQuartier	http://exp.cdn-hotels.com/hotels/200...	Sehr gut	Wien, Österreich	170 €
Derag Livinghotel City Apartments W...	http://exp.cdn-hotels.com/hotels/400...	Exzellent	Wien, Österreich	111 €
Hotel Sacher Wien	http://exp.cdn-hotels.com/hotels/100...	Exzellent	Wien, Österreich	430 €
Hotel Nestroy Wien	http://exp.cdn-hotels.com/hotels/100...	Sehr gut	Wien, Österreich	91 €
Tourotel Mariahilf	http://exp.cdn-hotels.com/hotels/100...	Sehr gut	Wien, Österreich	82 €
Star Inn Hotel Wien Schönbrunn	http://exp.cdn-hotels.com/hotels/600...	Sehr gut	Wien, Österreich	60 €
Arcotel Wimberger Vienna	http://exp.cdn-hotels.com/hotels/100...	Sehr gut	Wien, Österreich	70 €
Hotel Senator	http://exp.cdn-hotels.com/hotels/300...	Sehr gut	Wien, Österreich	49 €
A&O Wien Hauptbahnhof	http://exp.cdn-hotels.com/hotels/600...	Gut	Wien, Österreich	27 €
Delta Hotel Wien	http://exp.cdn-hotels.com/hotels/200...	Gut	Wien, Österreich	51 €
Hotel KUNSThof	http://exp.cdn-hotels.com/hotels/100...	Sehr gut	Wien, Österreich	49 €
Hotel Baron am Schottentor	http://exp.cdn-hotels.com/hotels/700...	Sehr gut	Wien, Österreich	59 €
A&O Wien Stadthalle	http://exp.cdn-hotels.com/hotels/300...	Gut	Wien, Österreich	30 €
Amedia Hotel Wien	http://exp.cdn-hotels.com/hotels/500...	Sehr gut	Wien, Österreich	89 €
Mercure Josefshof Wien	http://exp.cdn-hotels.com/hotels/100...	Sehr gut	Wien, Österreich	112 €
Atlantis Hotel Vienna	http://exp.cdn-hotels.com/hotels/100...	Gut	Wien, Österreich	60 €
pentahotel Vienna	http://exp.cdn-hotels.com/hotels/100...	Sehr gut	Wien, Österreich	104 €
Falkensteiner Hotel Am Schottenfeld	http://exp.cdn-hotels.com/hotels/200...	Sehr gut	Wien, Österreich	170 €
La Prima Fashion Hotel Vienna	http://exp.cdn-hotels.com/hotels/600...	Sehr gut	Wien, Österreich	79 €
BEST WESTERN PREMIER Kaiserhof ...	http://exp.cdn-hotels.com/hotels/100...	Exzellent	Wien, Österreich	170 €
Austria Trend Hotel Messe	http://exp.cdn-hotels.com/hotels/200...	Sehr gut	Wien, Österreich	85 €
InterCityHotel Wien	http://exp.cdn-hotels.com/hotels/100...	Gut	Wien, Österreich	97 €

Page 1 of 6 Displaying item 1 - 25 of 148 25

Fig 12: the Mozenda Web Console controls Agents (run, schedule) and Collections (filled by the agent)

Now we answer **additional questions.** In general, both wrappers were easy to build and quite intuitive to use. When using import.io, we had to extract detail information by using a second extractor and querying the data using the python script. On the other hand, we couldn't query mozenda data using the REST API directly, because this is not imported for trial accounts, so weh ad to do the extraction and export manually.

*** Document Model (DOM, Text, anything in addition to these)**

Import.io: The DOM is hidden from the user. One cannot see the DOM of the webpage. The only option to capture data is to use the mouse.
Mozenda: You can activate the feature, that DOM is visible in a control window at the bottom of the agent. If you click on an object, the specific DOM-entry is highlighted. But i didn't need to know about the DOM tree in this exercise.

*** Form Filling and Macro Recording**

Import.io: Quite natural I think. You navigate to the connector and can then start to record the form filling. Having seen the Lixto Visual Developer this is very restricted
and there is not much to configure. The only interaction you can parameterize later are text fields.
Mozenda: Very easy and intuitive, took about 15 minutes to set up the whole wrapper.

*** Transform original tree structure**

Import.io: Elements can be hidden to more easily capture elements that are overdrawn. It occured to me that this feature does not work in all circumstances.
Mozenda: feature not needed, most of the DOM functionality is hidden from the user.

*** Natural Language Processing Support**

Import.io: Limited. It is easy to learn certain parts of a text or phrase if it has an easy to find structure. It was quite hard to extract whole paragraphs of descriptions in the hotel details, and it did not really learn the description in the end (5 examples+).
Mozenda: Using regular expressions is supported

*** Heuristics and Rule Generation**

Import.io: Sometimes the recognistion of some rules does not work very well with only a few examples. It sometimes takes put to 5 examples until the recognition of the attribute is learned.
But as far as I have worked with import.io it is very robust after it is correct.

Mozenda: Recognition of rules is very simple and robust. Works after choosing two examples. If a rule cannot be applied (because website changes for example),a warning is displayed.

*** Image Recognition**

Import.io: Images are handled quite nice. As the page is rendered directly one can easily extract the images. Before one can do that the data attribute has to be set to the type „image".

Mozenda: also very nice, images are displayed directly when selected as output (Testing results), they can also be downloaded.

*** Scripting**

Import.io: While the rule learning is in progress there is not many parameters you can tweak.
But when the rules are completed you can access a very rich API in alot of different languages to aquire the data. It should be mentioned that the tool itself to genereate the wrapper for the cloud is really limited. That is why the extraction of the detail page has to be done with a seperate extraction call to the API.

Mozenda: no chance to learn the API calls since it cannot be used by a free account. Seems to be very powerful, agents can be steered and collections can be queried using constructed links.

*** Ajax Support and DOM Freezing, DOM Event Support**

Import.io: At first it always tries not to use the javascript engine. There are alot of dialogs asking you "Does the site look as expected?". If not it is reloaded with javascript enabled. This I think is quite good idea in terms of resources. But this fact makes extraction quite a tedious task when the javascript has to be enabled.

Mozenda: Agent waits for ajax-requests after loading content. Seems as if just a fixed time is waited, no matter how long the ajax- call needs to load data.

*** Input and Output Formats**

Import.io: Rich set of outputs. The wrapped data can be downloaded as EXCEL,HTML,JSON or CSV and by exposing a REST API those can be processed by any programming language.

Mozenda: input parameters: text; output format: CSV, TSV and XML

*** Control Browser Settings like User Agent**

Import.io: Cannot be changed. There are not many settings... At all.
Mozenda: Agents can be started, paused, restarted; time schedules can be defined

*** Parameterization**

Import.io: Can be specified when the is fetched from the REST API. This is quite conveinient but only supports textfields, not radio buttons, checkboxes, ...

Mozenda: can be specified when using the API (not working for free account)

*** Iteration, Conditions, Loops**

Import.io: Can only be done using a script backend.
Mozenda: all features included but hidden from the user (like pagination, if conditions)

*** Robustness and Adaptation**

Import.io: Not that robust, many times data is not extracted because the rules learned often could not be applied. Adaptation is really a problem. If you later change/add one attribute you have to train every attribute again in every example. This is not practicable in practice.
Mozenda: very robuts, easy to adapt

*** Automated Steps, Machine Learning (from multiple examples)**

Import.io: As mentioned earlier this is not practicable in practice because it certainly fails on hard tasks if one example is changed all the others have to be relearned.
Mozenda: very intuitive, little steps and examples needed

* Storing screenshots / html source to file system

Mozenda: capturing a screenshot is possible, but i couldn’t find html source to file system functionality

Import.io: I don't think this is implemented in import.io.

* Performance and Scalability

Import.io: Decent. Compared to open dapper it is a little faster.
Mozenda: quite good, but WebL was faster

* Ease of Use

Import.io: Certainly not a tool I would use again for this course and neither in a real world example. You can do simple things very easily but it is tedious (when examples have to be relearned) and soon is impractical.
Mozenda: very easy and intuitive

* Proxy Variations

Import.io: No way to configure a proxy in this tool.
Mozenda: couldn’t find this feature

* Captcha Support

Import.io: I don't think there is captcha support.
Mozenda: i couldn’t find this functionality

* Execution Environment

Import.io: There is the GUI tool which is used to learn the rules and later deploy them as individual 'apps' in their cloud computing environment. There the data can be queried using any language you like. The latter I found very nice to use.
Mozenda: agent builder is the local software for testing the agent, but to extract data the agent is executed on the mozenda server