

Suite of e-coaches aimed to analyse human behaviour

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17th July 2020

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- Mental disorders are very common in our society.

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- Doctors have high workloads.

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- Mental disorders are very common in our society.
- Doctors have high workloads.
- Mental diseases are taboo.

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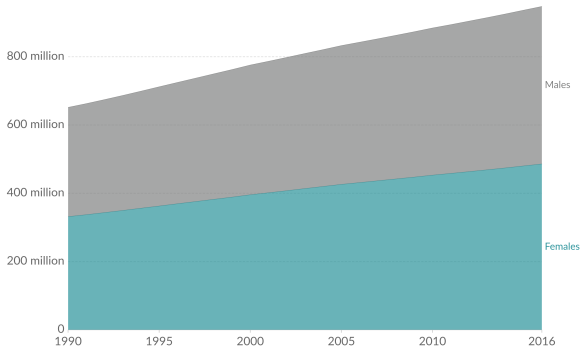
References

References

Number of people with mental health disorders, World, 1990 to 2016

Number of people with mental or intellectual developmental disability disorders, not including alcohol and drug use disorders. This is differentiated by sex.

Our World
in Data



Source: IHME, Global Burden of Disease (GBD)

CC BY

Figure: Number of people with mental health disorders

Reprinted from (Ritchie & Roser, 2018).

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- Technology is becoming increasingly integrated into our lives.

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- *E-coaches* suite as chatbots.

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- **Main goal:**
 - To develop a *conversational-agent-as-a-sensor* which will be able to interact with a person with a disorder and ask questions defined by specialists

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- **Secondary goals.**
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 - To design a flexible and scalable architecture to add functionality to the system.

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- **Secondary goals.**
 - To design a graphical web interface where doctors can consult their patient's responses.
 - To design a flexible and scalable architecture to add functionality to the system.
 - To design an architecture based on containers to host the different system modules.

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- **Main goal:**

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- **Secondary goals.**

- To design a graphical web interface where doctors can consult their patient's responses.
- To design a flexible and scalable architecture to add functionality to the system.
- To design an architecture based on containers to host the different system modules.
- To implement a system that covers the previous goals.

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- **Main goal:**

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- **Secondary goals.**

- To design a graphical web interface where doctors can consult their patient's responses.
- To design a flexible and scalable architecture to add functionality to the system.
- To design an architecture based on containers to host the different system modules.
- To implement a system that covers the previous goals.
- To test a beta version of the assistant in real people and analyse the retrieved data as well as target audience's feelings about it.

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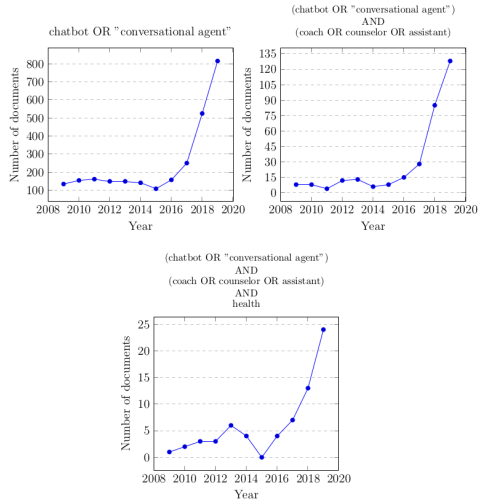


Figure: Search results of different queries performed in *scopus.com*.

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- Coaches: help users to get what they want.

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- Coaches: help users to get what they want.
- Counselors: help users to identify and solve problems.

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Platform	Daily active users (billions)	Free API for chatbots
(Facebook Messenger, 2008)	1.66	✓
(Whatsapp, 2009)	1.5	✗
(WeChat, 2011)	1.083	✓
(Telegram, 2013)	0.2	✓
(Kik, 2010)	0.015	✓
(Discord, 2015)	0.014	✓
(Slack, 2013)	0.012	✓
(Viber, 2010)	0.008	✓
(Line, 2012)	0.00723	✓

Table: Comparison between different chat applications (2019).

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- Facebook likes can be helpful to predict people's sensitive properties (Kosinski, Stillwell, & Graepel, 2013).

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- Facebook likes can be helpful to predict people's sensitive properties (Kosinski et al., 2013).
- Whatsapp's end-to-end encryption methods are not secure enough (Rastogi & Hendler, 2017).

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- Facebook likes can be helpful to predict people's sensitive properties (Kosinski et al., 2013).
- Whatsapp's end-to-end encryption methods are not secure enough (Rastogi & Hendler, 2017).
- Telegram provides more privacy protection (Sutikno et al., 2016).

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 - Modularity.
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 - CC BY-NC-SA 4.0 (*Creative Commons*, 2001) license.

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 - Questions and answers should be modifiable.

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- *Could have requirements.*

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 - Timezones support.
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 - Cross-platform.

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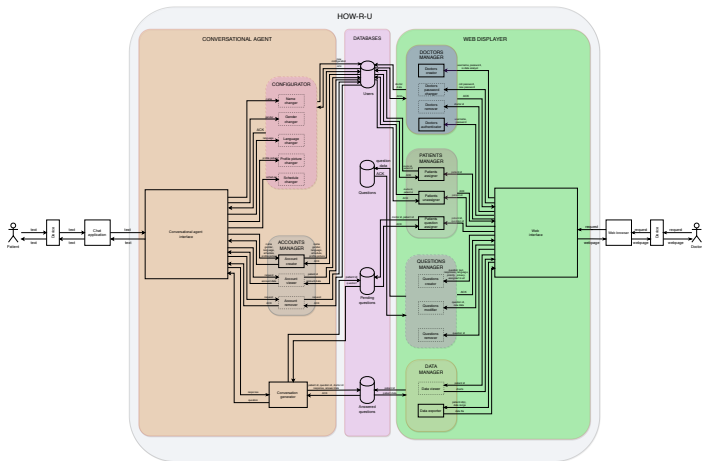


Figure: System architecture. Created using *diagrams.net* (*diagrams.net*, 2020).

Architecture

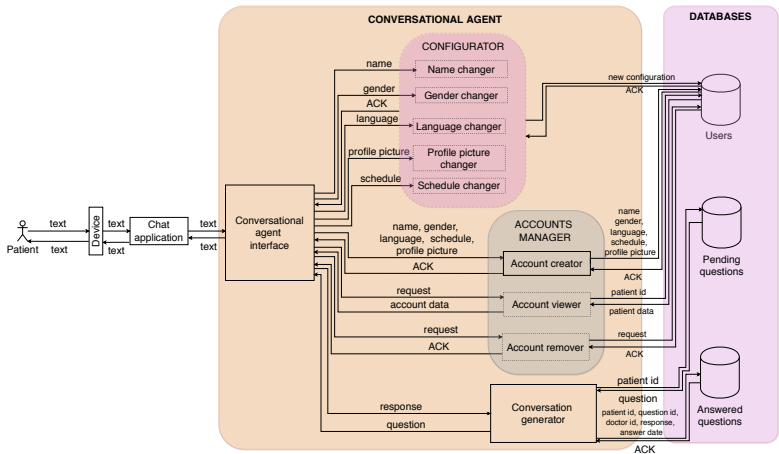


Figure: System architecture (conversational agent and databases).

Architecture

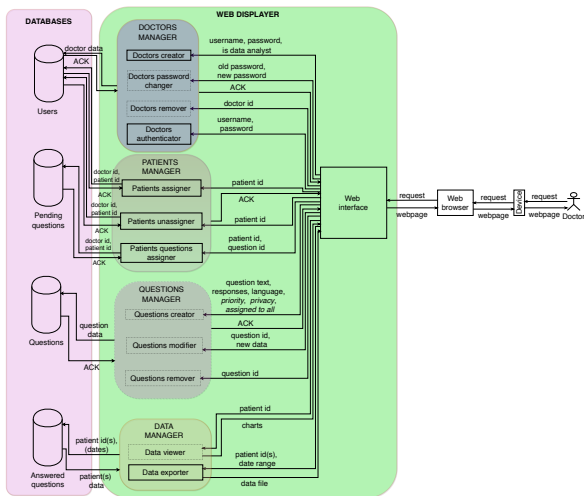


Figure: System architecture (web interface and databases).

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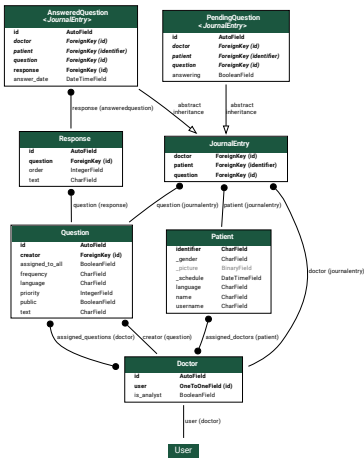


Figure: System class diagram (HOW-R-U classes)

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- Python 3.6.10 (Van Rossum & Drake, 2009)

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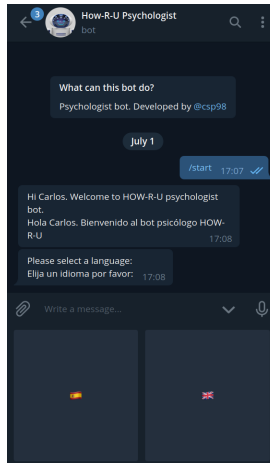


Figure: Agent showing the welcome message and asking for language selection.

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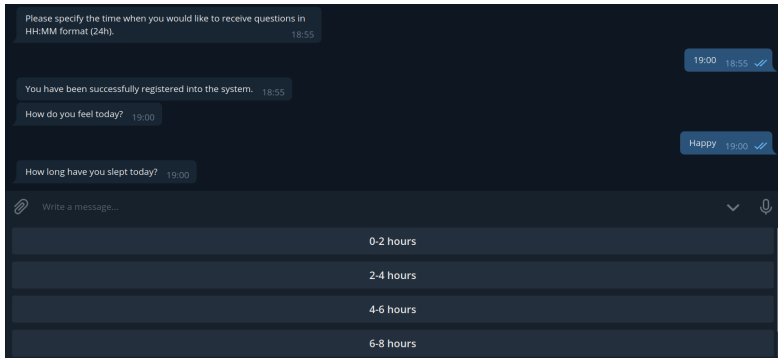


Figure: HOW-R-U conversational agent asking a question to a patient.

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- Django (*Django*, 2020) project.
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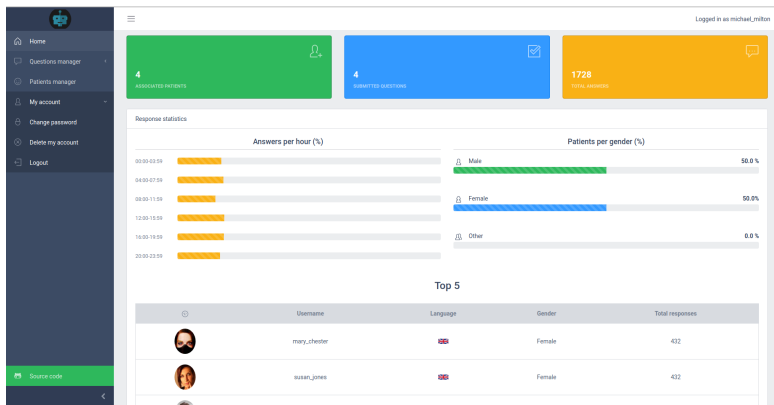


Figure: HOW-R-U homepage.

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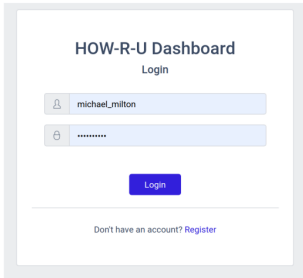
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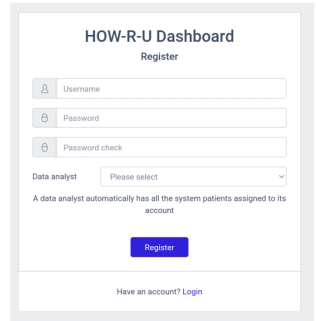


HOW-R-U Dashboard

Login

Login

Don't have an account? [Register](#)



HOW-R-U Dashboard

Register

Data analyst

A data analyst automatically has all the system patients assigned to its account

Register

Have an account? [Login](#)

Figure: Doctors manager.

Question text (empty to get all questions) 🔍 Search

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The screenshot displays a web application for managing questions. On the left is a dark sidebar with a menu containing: Home, Questions manager (selected), Patients manager, and My account. Below these is a green bar labeled 'Source code'. The main content area is titled 'Modify a question' and contains a form with the following fields:

- Question:** A text input field containing 'This is test question number 17'.
- Possible responses:** A large text area containing a list: 'response 1', 'response 2', 'response 3', and 'response 4'.
- Privacy:** A dropdown menu set to 'Public'.
- Language:** A dropdown menu set to 'English'.
- Frequency:** A dropdown menu set to 'Daily'.
- Priority:** A dropdown menu set to '1'.
- Assigned to all:** A dropdown menu set to 'Yes'.

At the bottom of the form are two buttons: 'Submit' (blue) and 'Cancel' (red). The footer of the page includes a 'Source code' link, a 'HOW-TO Dashboard' link, and a 'Forked from AppSeed' link.

Figure: Questions creator and modifier.

Implementation (web interface)

The screenshot shows a web interface for a 'Patients manager' dashboard. On the left is a dark sidebar with navigation links: Home, Questions manager, Patients manager, My account, Source code, and HOW-R-U Dashboard. The main content area is titled 'Assign questions to patient mary_chester' and contains a table with question data. The table has columns for Question text, Possible responses, Frequency, Priority, Privacy, Creator, Language, and Actions. The 'Privacy' column uses color-coded status: 'Public' in green and 'Private' in red. The 'Actions' column contains 'Unassign' (red) and 'Assign' (blue) buttons. The bottom of the page shows 'Forked from AppSeed'.

Question text	Possible responses	Frequency	Priority	Privacy	Creator	Language	Actions
Do you feel sad and cry easily?	Yes No	Daily	1	Public	michael_milton (You)	English	Unassign
Have you noticed an appetite decrease in the last week?	Yes No	Weekly	1	Private	michael_milton (You)	English	Assign
How do you feel today?	Sad Tired Happy Very happy	Daily	1	Public	michael_milton (You)	English	Unassign
How long have you slept today?	0-2 hours 2-4 hours 4-6 hours 6-8 hours More than 8 hours	Daily	1	Public	michael_milton (You)	English	Unassign

Figure: Patients manager assign questions page.

Implementation (web interface)

Select patients to export

susan_jones
robert_garfield
oliver_morton
mary_chester

Start date

04/01/2020

Please enter a valid date

End date

mm/dd/yyyy

June 2020

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

Today

Submit Reset

Figure: Export page

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Patient username	Question	Answer	Date
robert_garfield	How do you feel today?	Tired	2020-04-01 04:12:20
robert_garfield	How do you feel today?	Sad	2020-04-02 05:24:20
robert_garfield	How long have you slept today?	0-2 hours	2020-04-01 12:56:20
robert_garfield	How long have you slept today?	4-6 hours	2020-04-02 11:28:20
robert_garfield	Do you feel sad and cry easily?	Yes	2020-04-01 14:22:21
robert_garfield	Do you feel sad and cry easily?	No	2020-04-02 06:31:21
oliver_morton	How do you feel today?	Very happy	2020-04-01 01:45:19
oliver_morton	How do you feel today?	Happy	2020-04-02 02:59:19
oliver_morton	How long have you slept today?	More than 8 hours	2020-04-01 20:51:20
oliver_morton	How long have you slept today?	2-4 hours	2020-04-01 22:24:20
oliver_morton	Do you feel sad and cry easily?	No	2020-04-01 07:47:20
oliver_morton	Do you feel sad and cry easily?	Yes	2020-04-02 17:26:20
oliver_morton	Have you noticed an appetite decrease in the last week?	Yes	2020-04-01 21:41:20
oliver_morton	Have you noticed an appetite decrease in the last week?	Yes	2020-04-08 21:09:20

Table: Example data generated with the *Export* feature.

Implementation (web interface)

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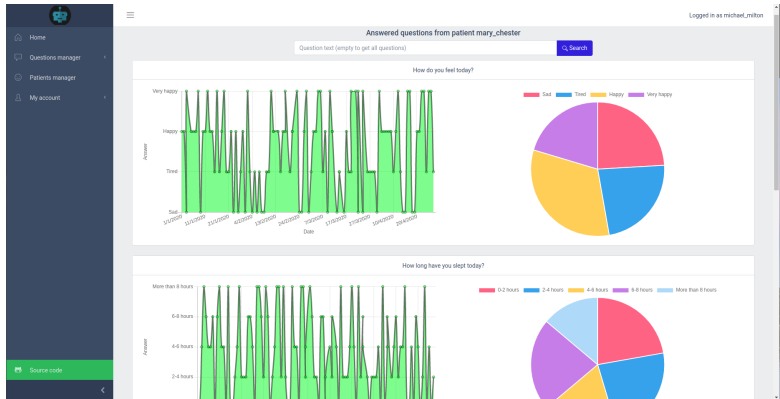


Figure: View data page.

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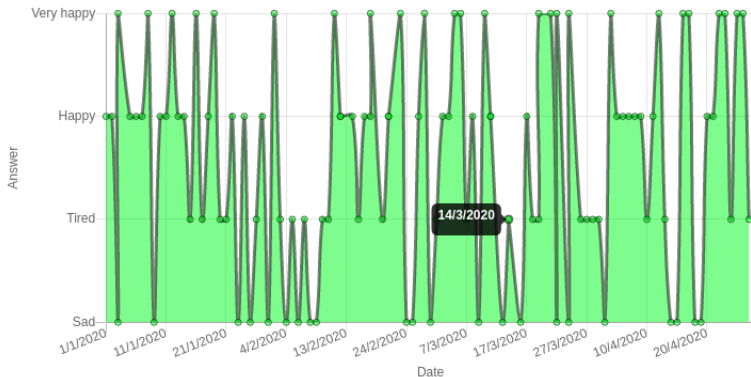


Figure: View data page (line chart).

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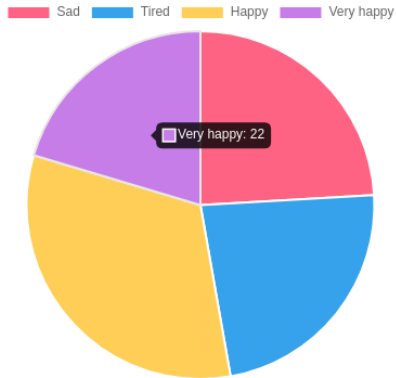


Figure: View data page (pie chart).

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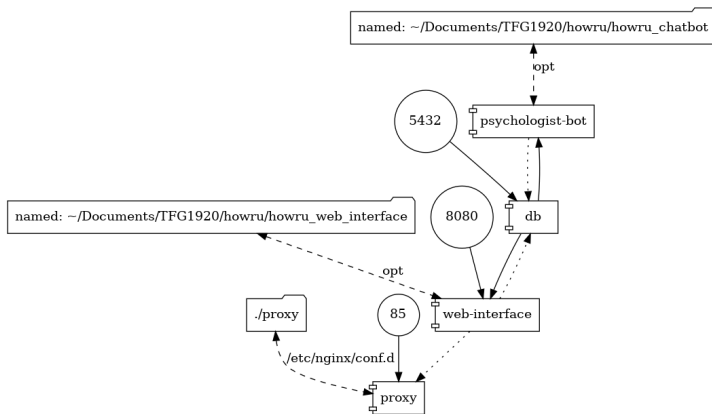


Figure: Docker-compose file schema. Generated by (PSIH, 2016).

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Production scalable environment

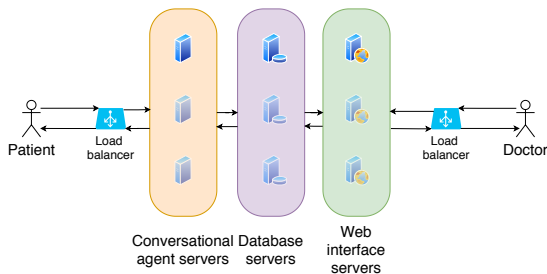


Figure: Scalable environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

Production non-scalable environment

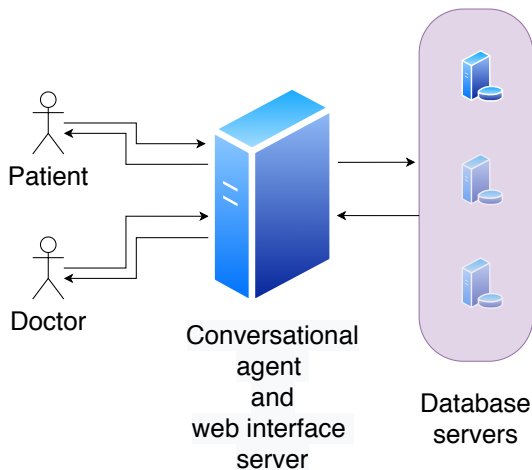


Figure: Non-scalable environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

Production one-instance environment

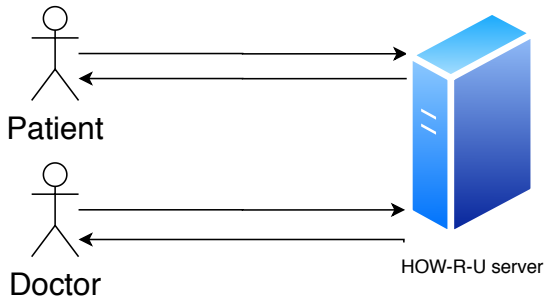


Figure: One-instance environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

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STRENGTHS

1. Different scenarios.
2. Multiple e-coaches.
3. Intuitive interface.
4. No extra software for patients.

OPPORTUNITIES

1. COVID-19 data analysis.
2. Telegram ensures privacy.

WEAKNESSES

1. Telegram is not used by the majority of people.
2. System deployment requires knowledge on computer science.

THREATS

1. Elderly people may not know how to use Telegram.
2. If patients do not have Telegram installed, they could install a specific app instead of Telegram.
3. Not all patients have smartphones.

Figure: HOW-R-U SWOT analysis. Based on <http://www.mostlycolor.ch/2015/07/swot-matrices-in-latex.html>.

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- **Main goal:** to develop a *conversational-agent-as-a-sensor* which will be able to interact with a person with a disorder and ask questions defined by specialists.

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- **Main goal:** to develop a *conversational-agent-as-a-sensor* which will be able to interact with a person with a disorder and ask questions defined by specialists. ✓
- **Secondary goals.**

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- **Main goal:** to develop a *conversational-agent-as-a-sensor* which will be able to interact with a person with a disorder and ask questions defined by specialists. ✓
- **Secondary goals.**
 - To design a graphical web interface where doctors can consult their patient's responses.

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- **Secondary goals.**
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 - To design a flexible and scalable architecture to add functionality to the system.

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 - To design an architecture based on containers to host the different system modules.

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 - To design a graphical web interface where doctors can consult their patient's responses. ✓
 - To design a flexible and scalable architecture to add functionality to the system. ✓
 - To design an architecture based on containers to host the different system modules. ✓
 - To implement a system that covers the previous goals.

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 - To design an architecture based on containers to host the different system modules. ✓
 - To implement a system that covers the previous goals. ✓
 - To test a beta version of the assistant in real people and analyse the retrieved data as well as target audience's feelings about it.

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The end

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Thank you for your attention

Time for questions