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HOW-R-U?

Suite of e-coaches aimed to analyse human behaviour

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- Mental disorders are very common in our society.

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- Mental disorders are very common in our society.
- 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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- Mental disorders are very common in our society.
- Doctors have high workloads.
- Mental diseases are taboo.
- No continuous traceability of patient's health status.

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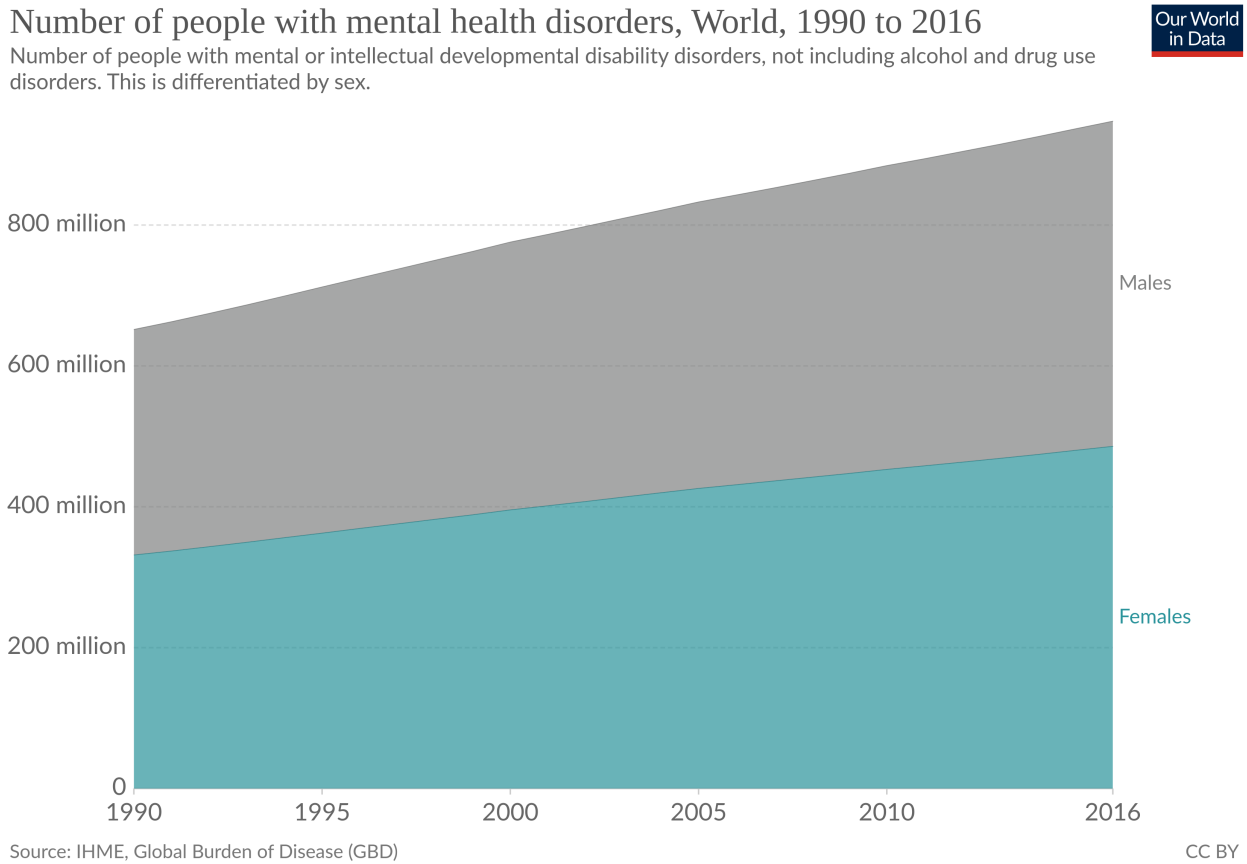

Figure: Number of people with mental health disorders

Reprinted from (Ritchie & Roser, 2018).

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- Technology is becoming increasingly integrated into our lives.

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- Technology is becoming increasingly integrated into our lives.
- Smartphones are used in a daily basis.

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- Technology is becoming increasingly integrated into our lives.
- Smartphones are used in a daily basis.
- Chatbots are growingly becoming popular.

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- Technology is becoming increasingly integrated into our lives.
- Smartphones are used in a daily basis.
- Chatbots are growingly becoming popular.
- In Spain there are 2 psychologists per 100.000 citizens (Vicente, 2019).

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- *E-coaches* suite as chatbots.

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- *E-coaches* suite as chatbots.
- Doctors can assign questions to patients.

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- *E-coaches* suite as chatbots.
- Doctors can assign questions to patients.
- Data analysis.

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- *E-coaches* suite as chatbots.
- Doctors can assign questions to patients.
- Data analysis.
- Psychologist bot.

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- **Main goal**:

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

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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.
  - 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**:
  - 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.
  - 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**:
  - 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.
  - 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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Number of publications related to chatbots

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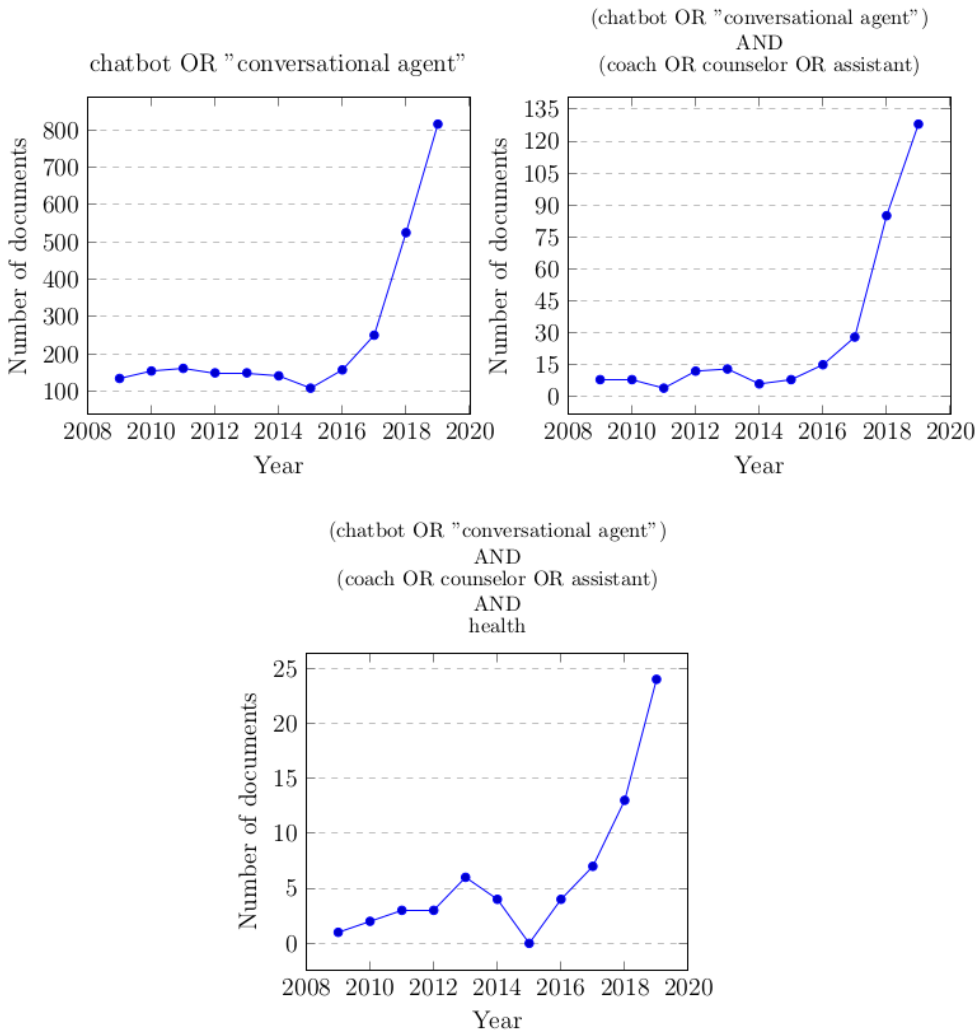

Figure: Search results of different queries performed in *scopus.com*.

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- Areas of application.

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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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- *Must have* requirements.

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- *Must have* requirements.
  - Ask questions to the patients.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
  - User's enrollment and deletion.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
  - User's enrollment and deletion.
  - File with patients' answers.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
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  - File with patients' answers.
  - Modularity.

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- *Must have* requirements.
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  - Modularity.
- *Should have* requirements.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
  - User's enrollment and deletion.
  - File with patients' answers.
  - Modularity.
- *Should have* requirements.
  - CC BY-NC-SA 4.0 (*Creative Commons*, 2001) license.

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  - File with patients' answers.
  - Modularity.
- *Should have* requirements.
  - CC BY-NC-SA 4.0 (*Creative Commons*, 2001) license.
  - Questions and answers should be modifiable.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
  - User's enrollment and deletion.
  - File with patients' answers.
  - Modularity.
- *Should have* requirements.
  - CC BY-NC-SA 4.0 (*Creative Commons*, 2001) license.
  - Questions and answers should be modifiable.
  - Public questions.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
  - User's enrollment and deletion.
  - File with patients' answers.
  - Modularity.
- *Should have* requirements.
  - CC BY-NC-SA 4.0 (*Creative Commons*, 2001) license.
  - Questions and answers should be modifiable.
  - Public questions.
  - Configurable schedule.

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- *Must have* requirements.
  - Ask questions to the patients.
  - Custom keyboard.
  - User's enrollment and deletion.
  - File with patients' answers.
  - Modularity.
- *Should have* requirements.
  - CC BY-NC-SA 4.0 (*Creative Commons*, 2001) license.
  - Questions and answers should be modifiable.
  - Public questions.
  - Configurable schedule.
  - Interactive charts.

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- *Could have* requirements.

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- *Could have* requirements.
  - Numeric order of questions.

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- *Could have* requirements.
  - Numeric order of questions.
  - Custom questions frequency.

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- *Could have* requirements.
  - Numeric order of questions.
  - Custom questions frequency.
  - Other languages.

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- *Could have* requirements.
  - Numeric order of questions.
  - Custom questions frequency.
  - Other languages.
  - Password change.

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- *Could have* requirements.
  - Numeric order of questions.
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  - Other languages.
  - Password change.
  - Two factor authentication.

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- *Could have* requirements.
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- *Could have* requirements.
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  - Delete data from users.

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- *Could have* requirements.
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  - Delete data from users.
  - View and modify profile data.

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  - Delete data from users.
  - View and modify profile data.
  - Assign questions to all patients.

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  - Assign questions to all patients.
  - Timezones support.

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  - Groups.
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  - View and modify profile data.
  - Assign questions to all patients.
  - Timezones support.
- *Won't have* requirements.

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  - Other languages.
  - Password change.
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  - Groups.
  - Delete data from users.
  - View and modify profile data.
  - Assign questions to all patients.
  - Timezones support.
- *Won't have* requirements.
  - Cross-platform.

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  - Other languages.
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  - Groups.
  - Delete data from users.
  - View and modify profile data.
  - Assign questions to all patients.
  - Timezones support.
- *Won't have* requirements.
  - Cross-platform.
  - Share the retrieved data with third parties.

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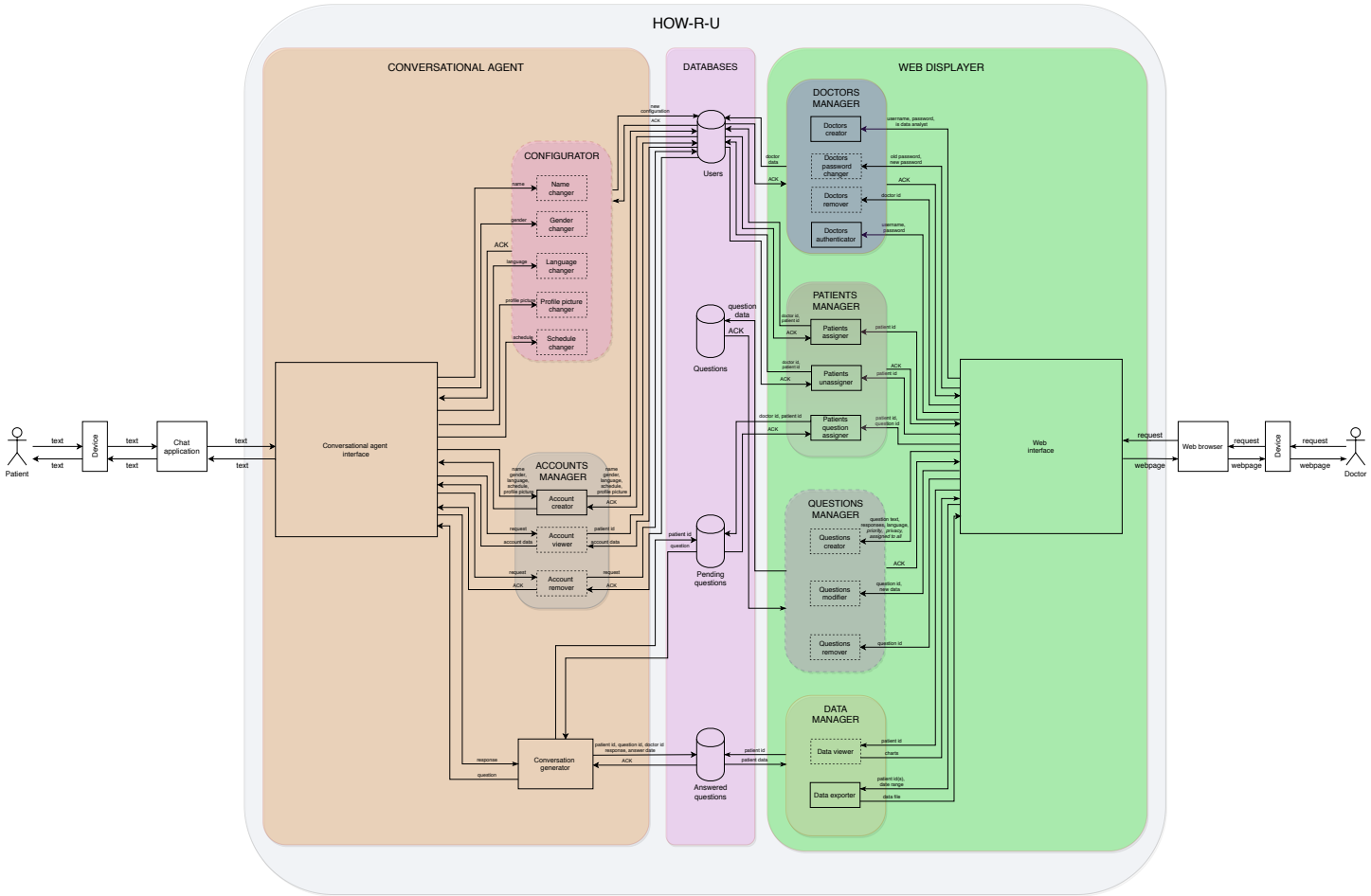

Figure: System architecture. Created using *diagrams.net* (*diagrams.net*, 2020).

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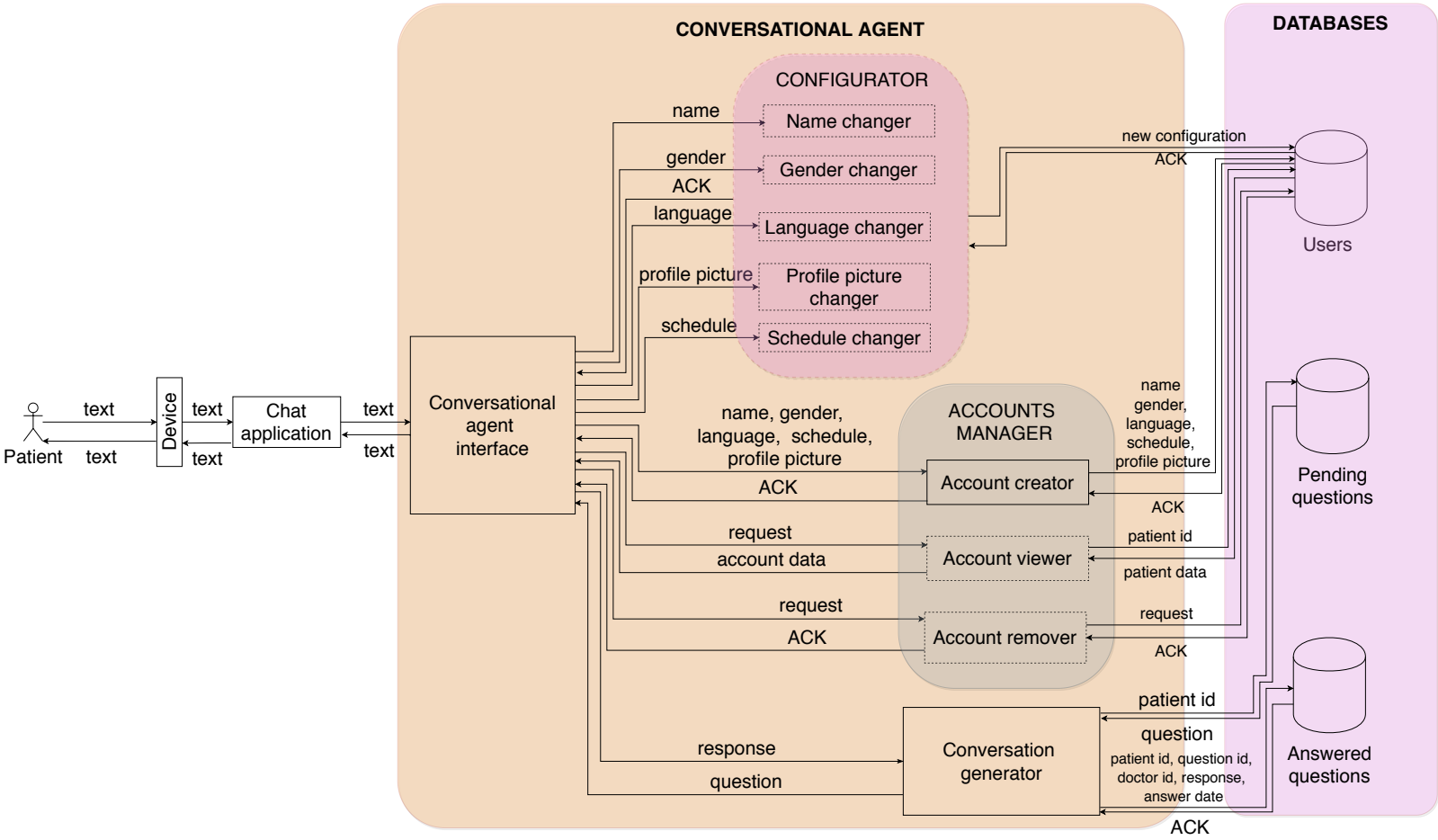

Figure: System architecture (conversational agent and databases).

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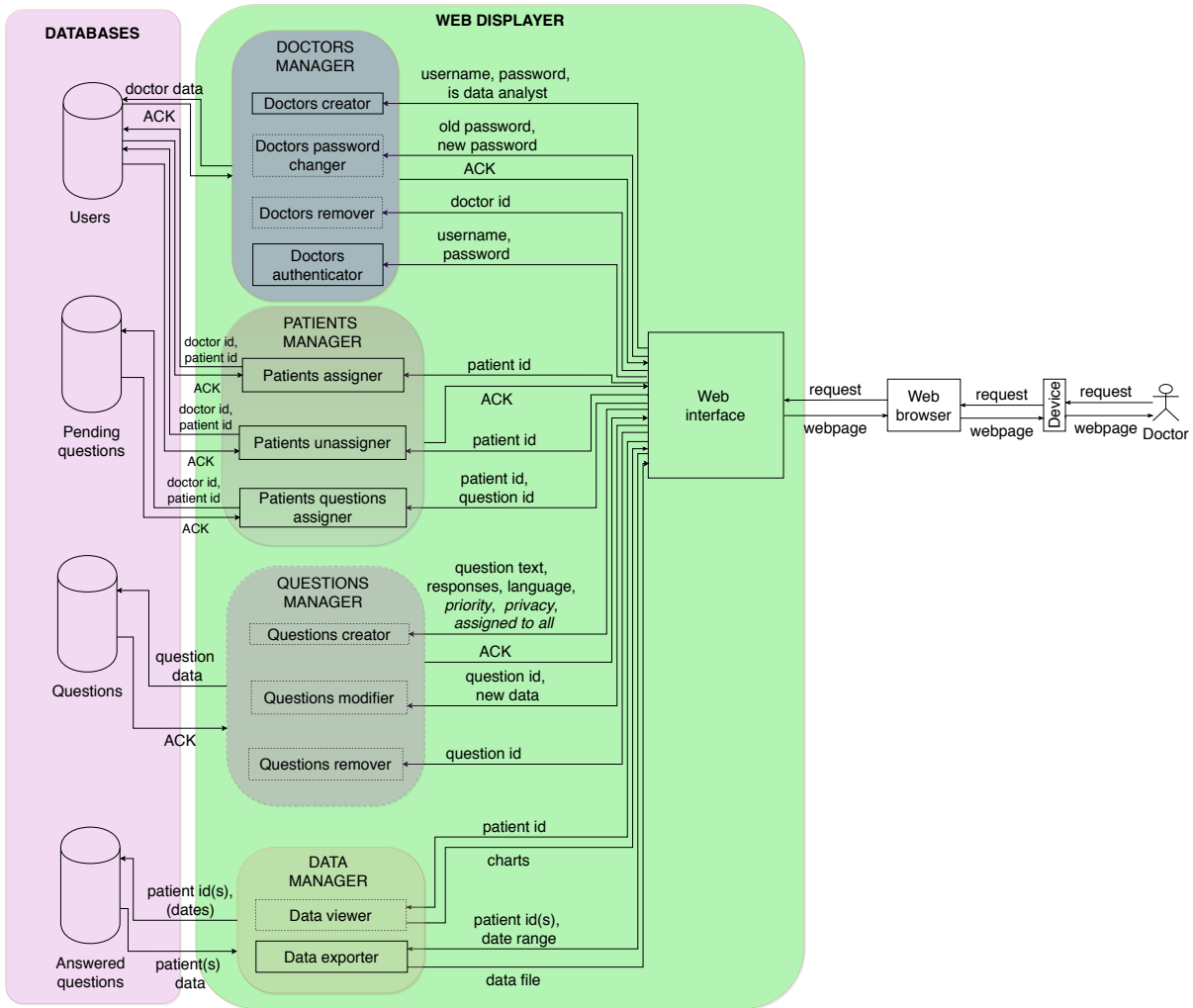

Figure: System architecture (web interface and databases).

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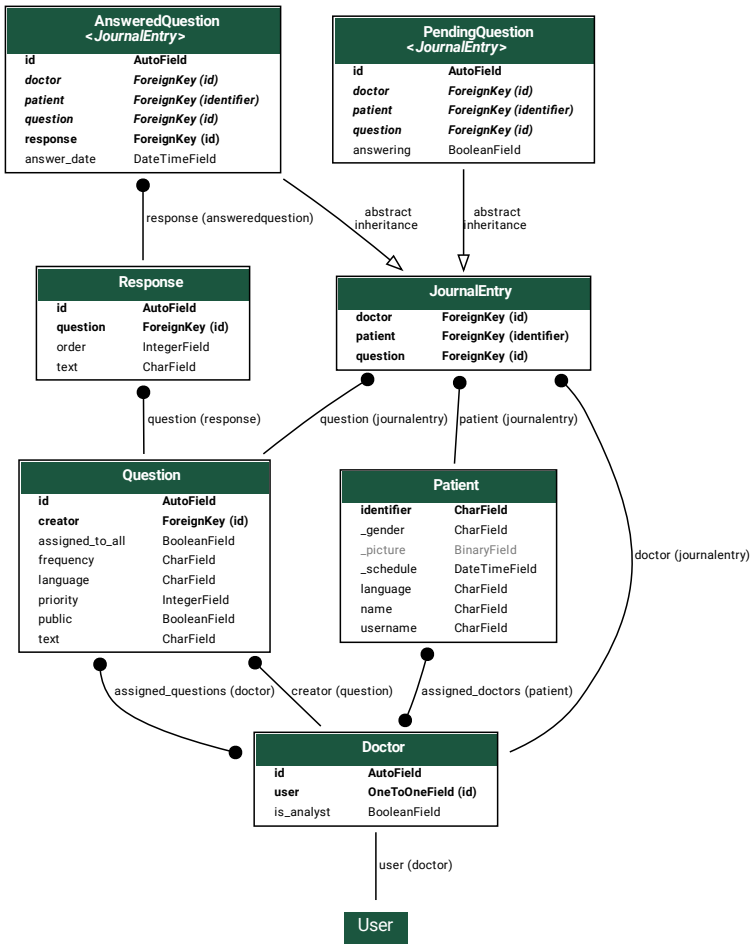

Figure: System class diagram (HOW-R-U classes)

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- Python 3.6.10 (Van Rossum & Drake, 2009)

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- Python 3.6.10 (Van Rossum & Drake, 2009)
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- Python 3.6.10 (Van Rossum & Drake, 2009)
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  - Start handler
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  - Question handler.
- Jobs.

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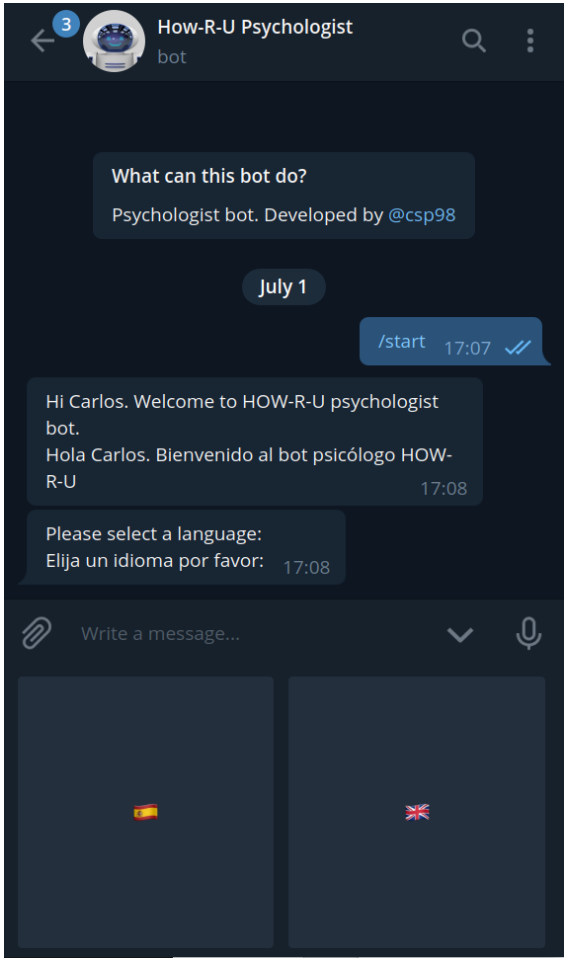

Figure: Agent showing the welcome message and asking for language selection.

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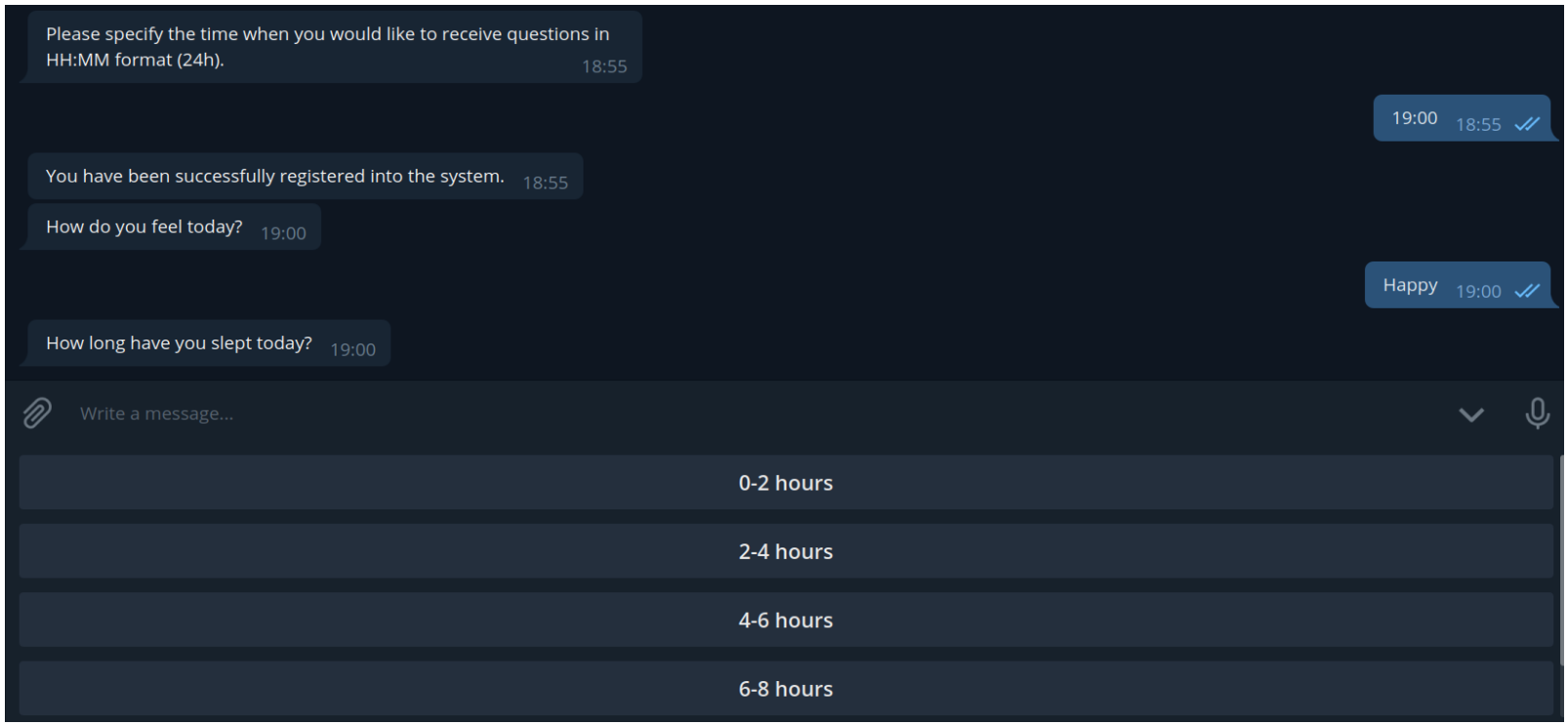

Figure: HOW-R-U converstional agent asking a question to a patient.

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- Django (*Django*, 2020) project.

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- Django (*Django*, 2020) project.
- Applications.
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- Django (*Django*, 2020) project.
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  - Homepage.
  - Doctors manager.

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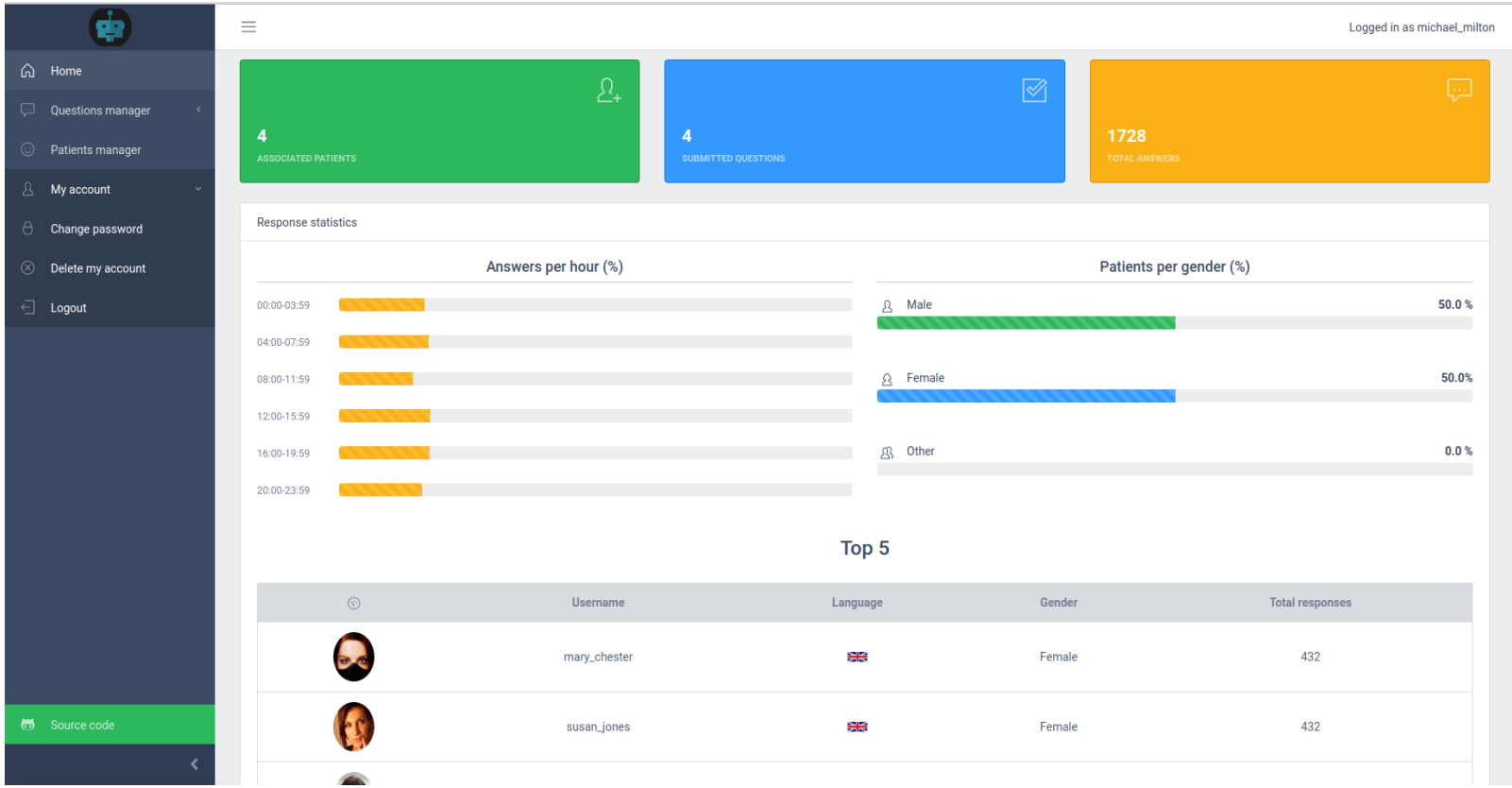

Figure: HOW-R-U homepage.

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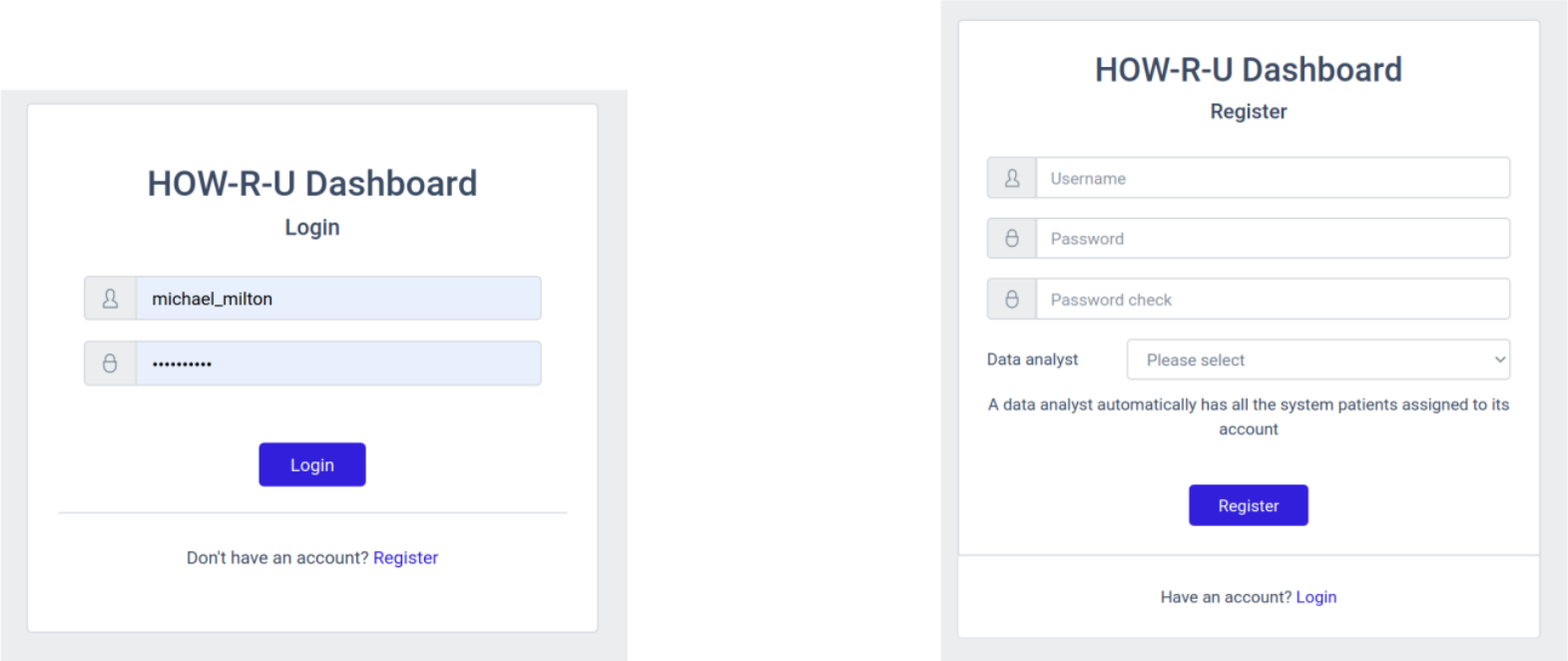

Figure: Doctors manager.

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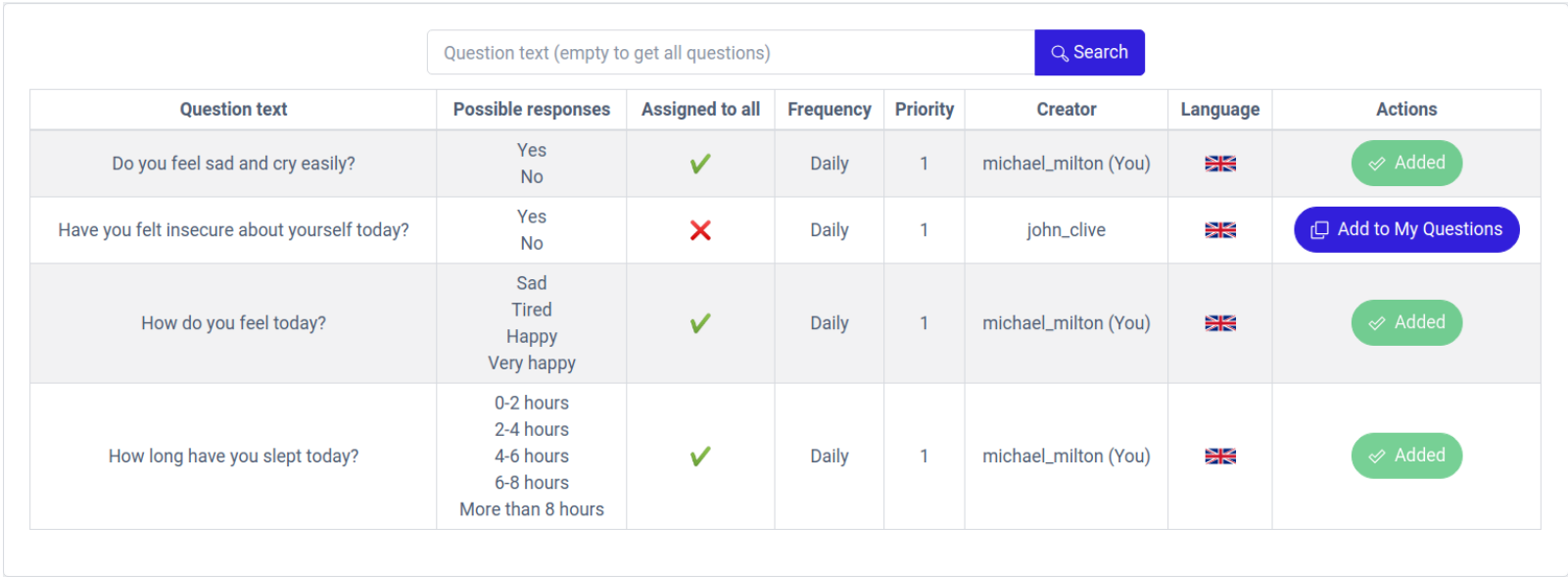

Figure: Public questions page.

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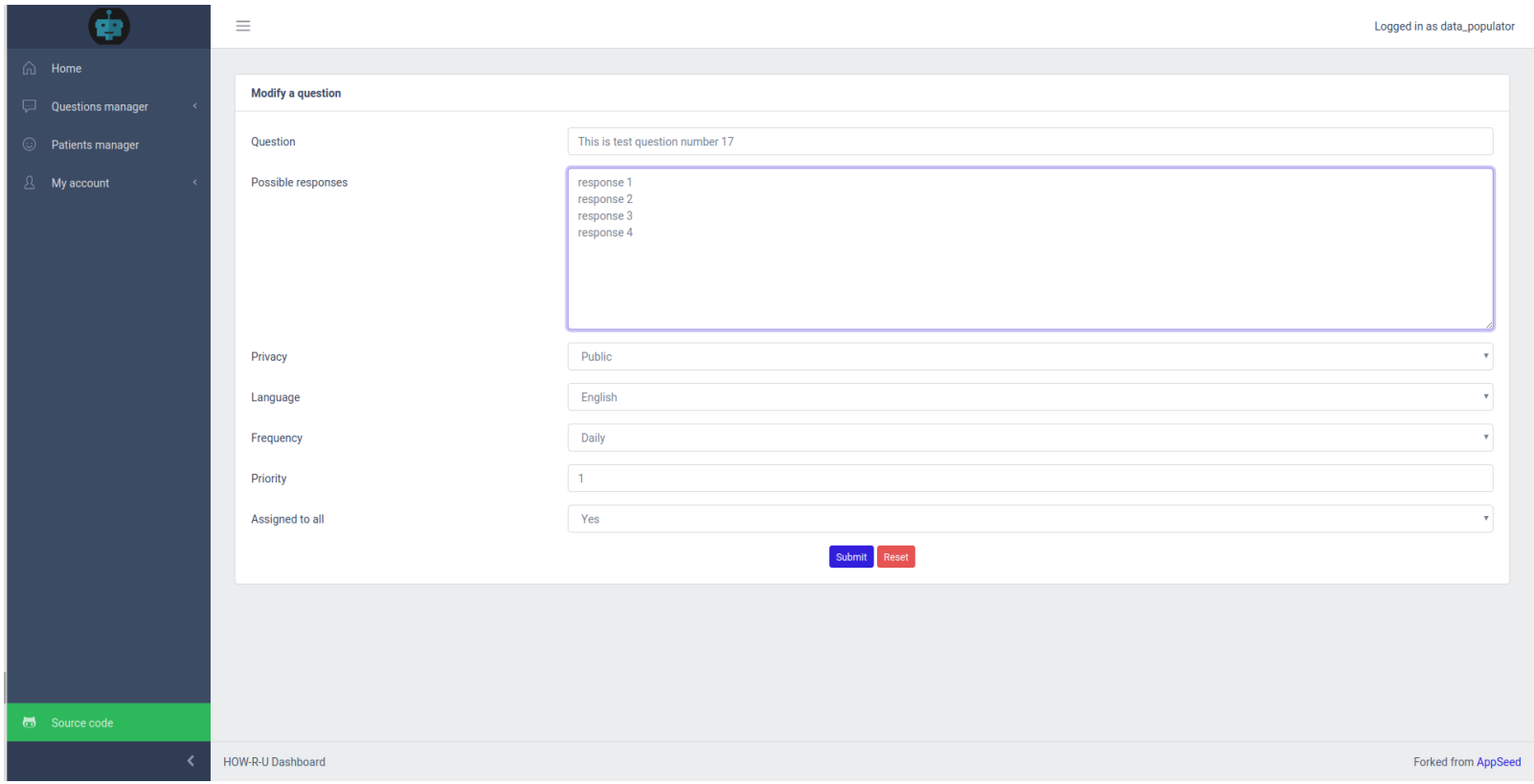

Figure: Questions creator and modifier.

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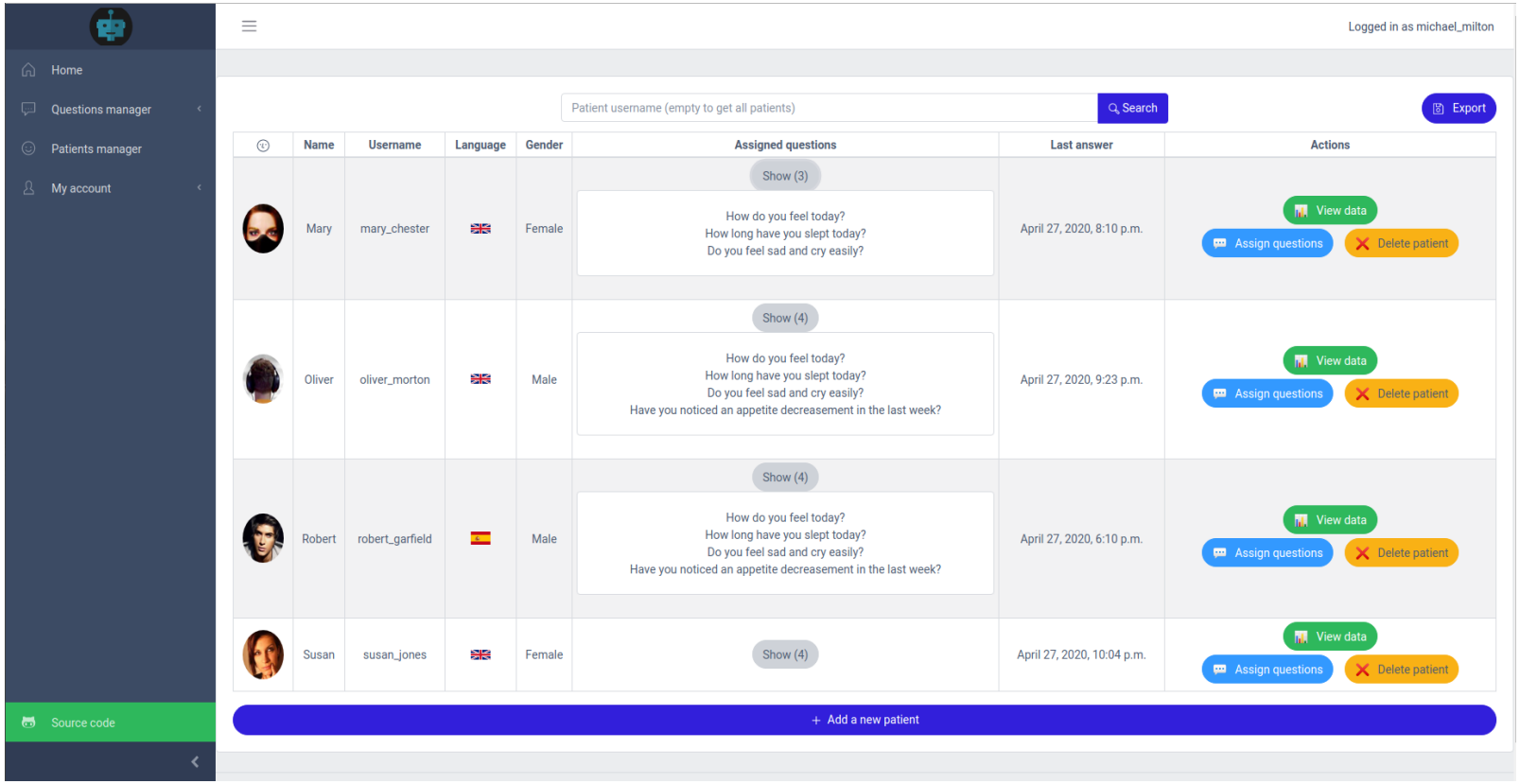

Figure: Patients manager.

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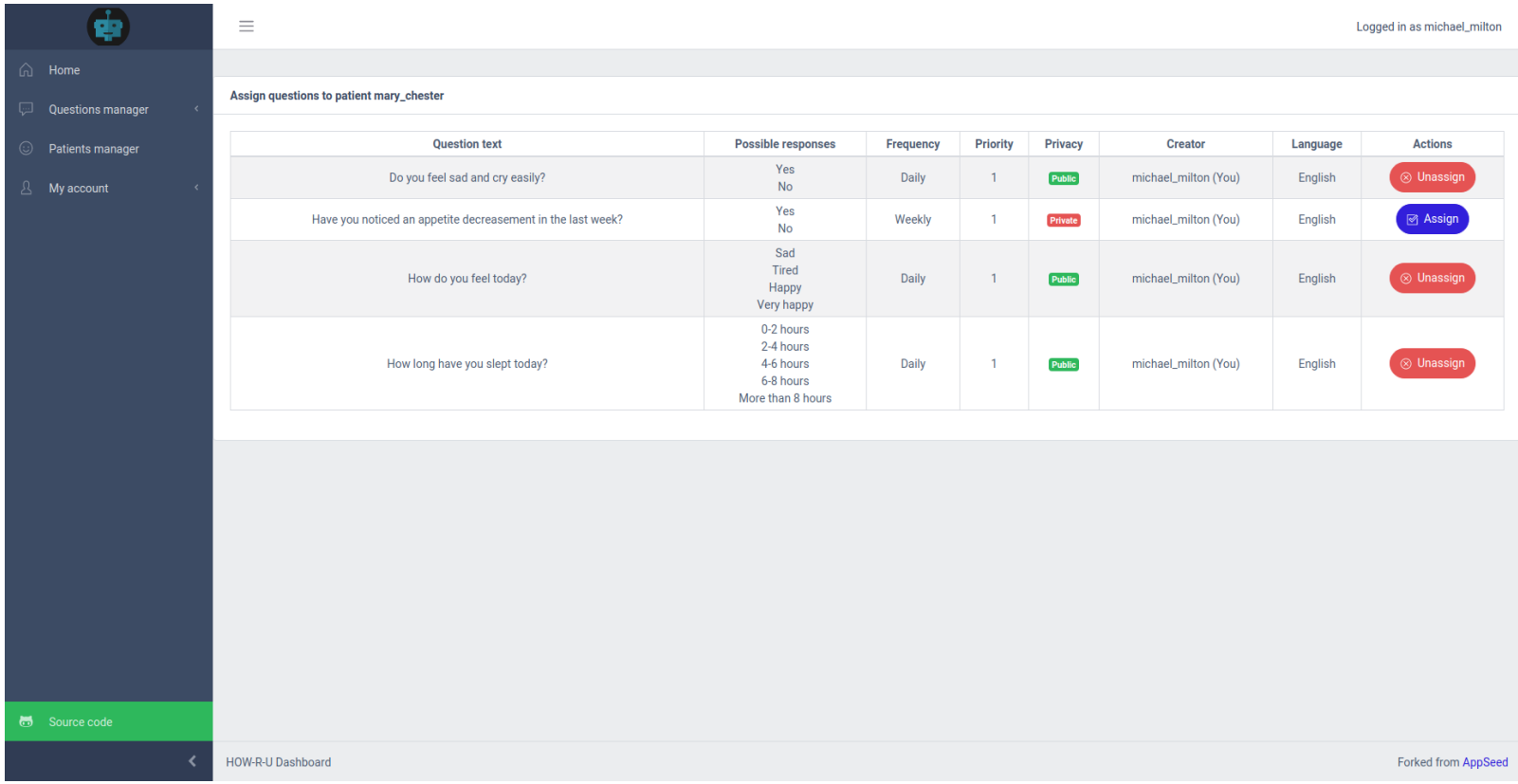

Figure: Patients manager assign questions page.

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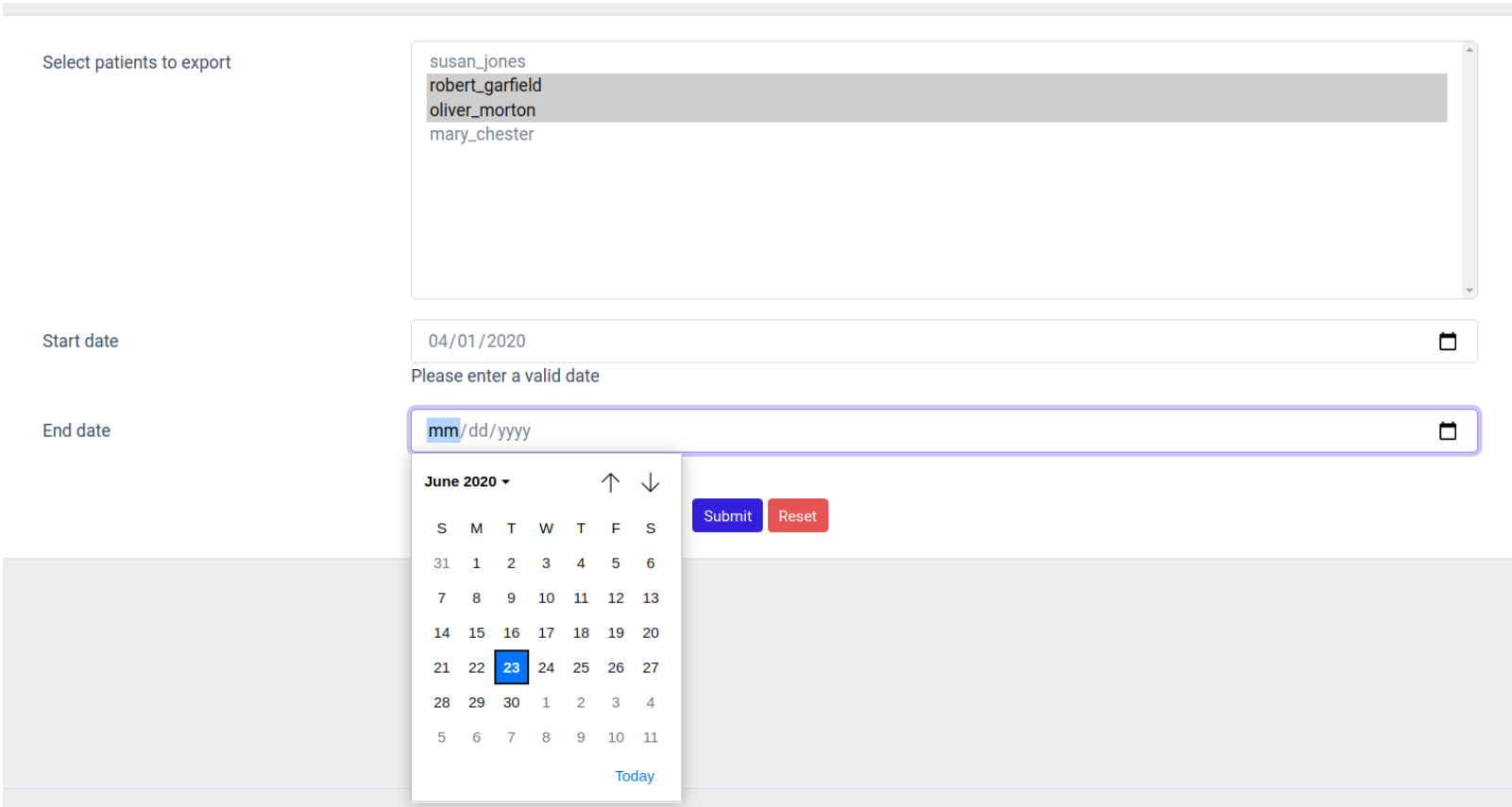

Figure: Export page

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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 decreasement in the last week?	Yes	2020-04-01 21:41:20
oliver_morton	Have you noticed an appetite decreasement in the last week?	Yes	2020-04-08 21:09:20

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

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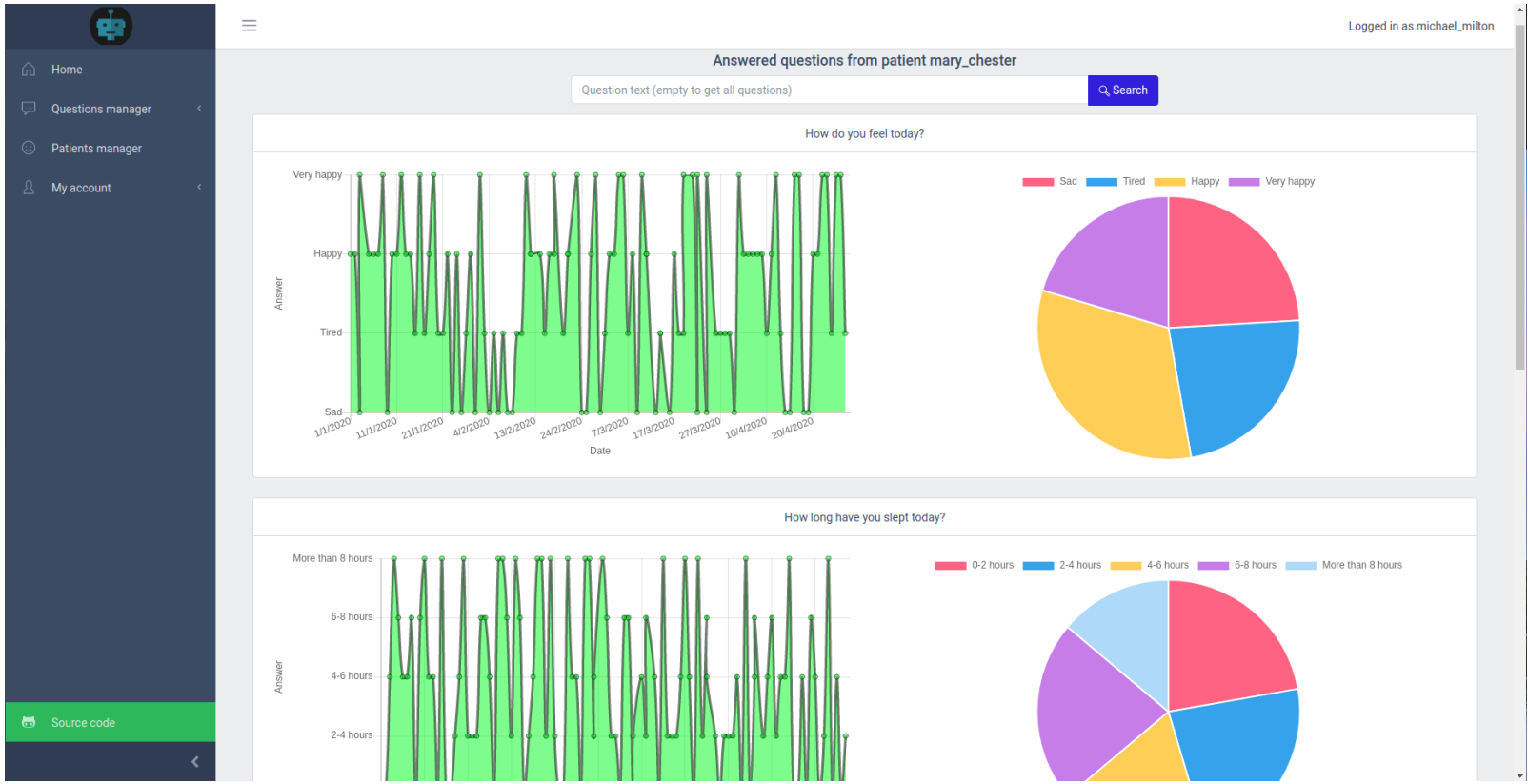

Figure: View data page.

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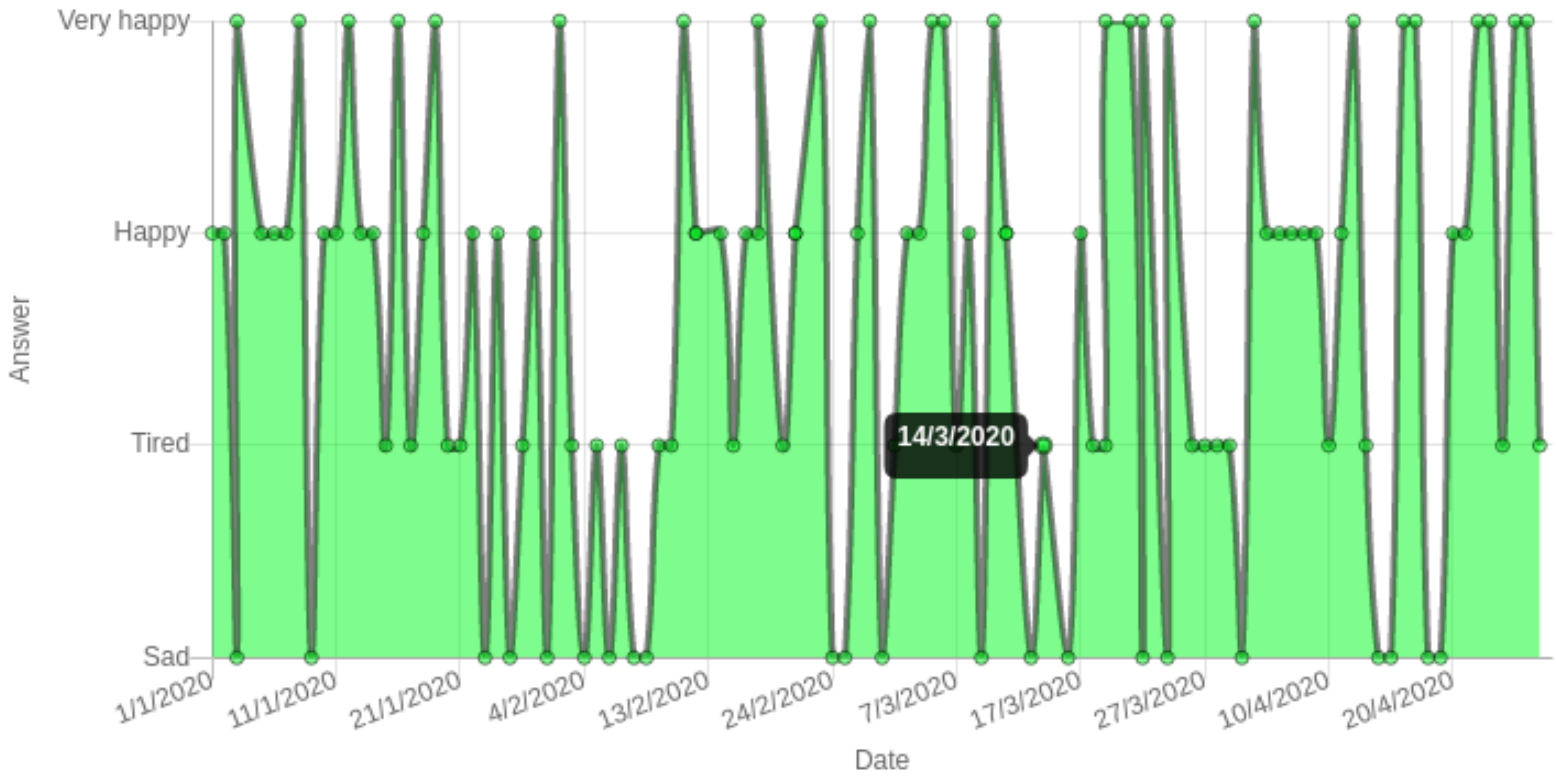

Figure: View data page (line chart).

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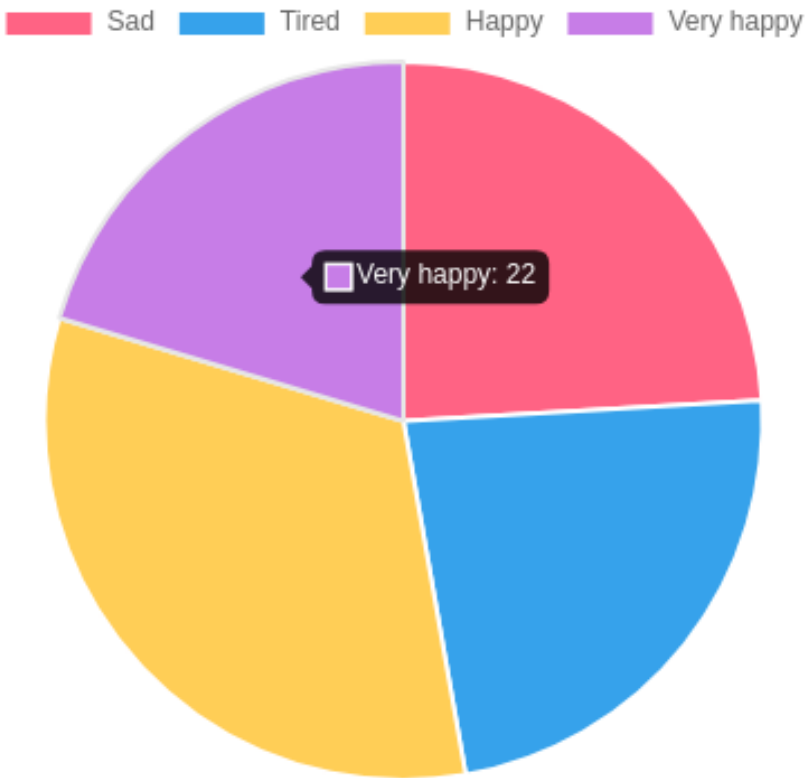

Figure: View data page (pie chart).

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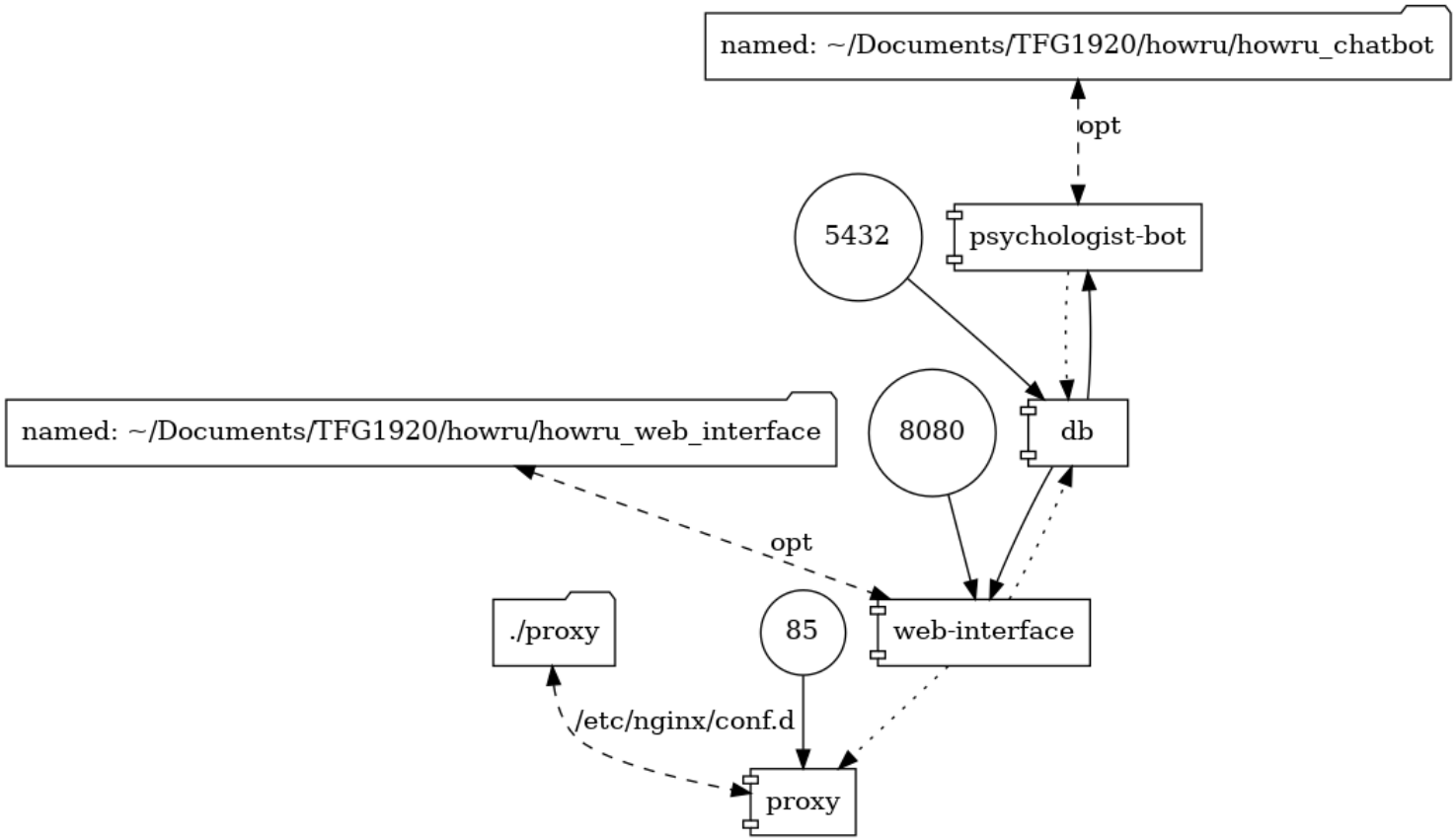

Figure: Docker-compose file schema. Generated by (PSIH, 2016).

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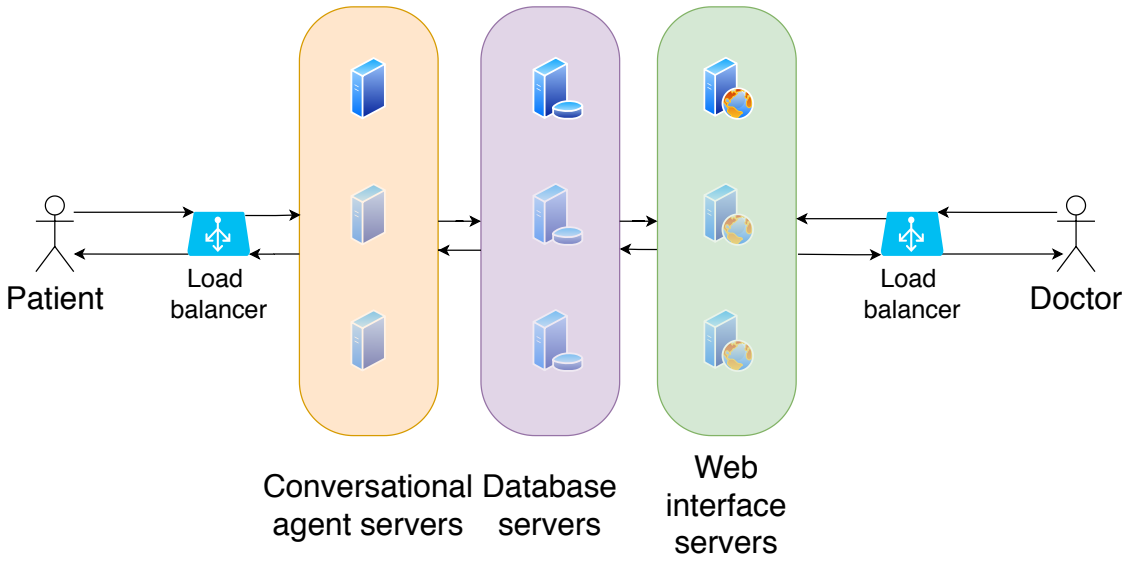

Figure: Scalable environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

Production non-scalable environment

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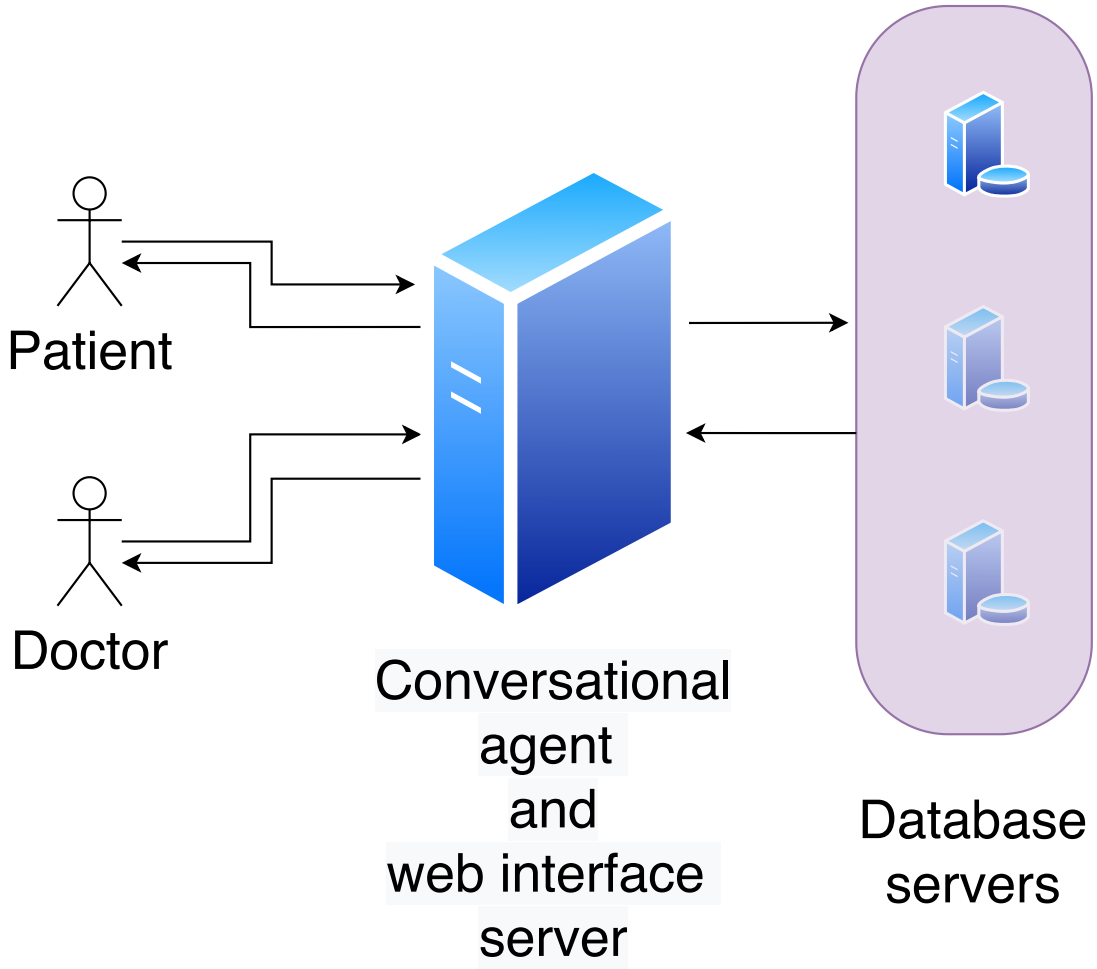

Figure: Non-scalable environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

Production one-instance environment

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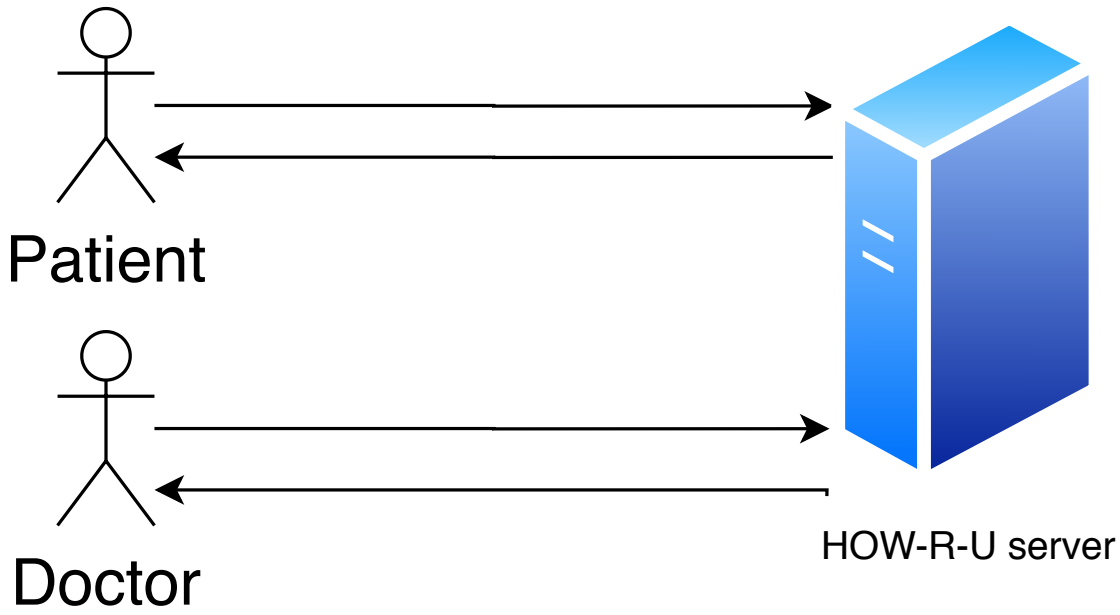

Figure: One-instance environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

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STRENGTHS

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

WEAKNESSES

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

OPPORTUNITIES

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

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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- **Secondary goals**.
  - To design a graphical web interface where doctors can consult their patient's responses.

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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.

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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