**Scheduled Task Manager**

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**Introduction:** Providing interactive services to patients through SMS

**A Little About the Motivation for this Project**

- Childhood cancer survivors and their healthcare needs
  The abstract goal of this project is to keep survivors of childhood cancers “in the loop” of being aware of their continued healthcare needs. In practice, this translates to managing regular appointments with their healthcare providers and fostering communication between them and the clinicians at the comprehensive cancer center that oversees their long-term care.
- SMS for facilitating patient involvement
  While the system currently only supports clinicians requesting information from the patient, we intend to extend the system to support patients self-reporting on various aspects of their health and quality of life, again to further the goal of bringing patients into greater awareness of and involvement in their care.

**Problem Description:** Target demographic predominantly has access to SMS-based phones

**Bridging the “Digital Divide”: Working with Childhood Cancer Survivor**

For this project, our target demographic consists of young adults (aged 18-24) who potentially come from economically disadvantaged backgrounds. A large percentage of these individuals have access to SMS-enabled phones, but many of them don’t have access to smartphones (i.e. phones on which custom applications can be run), or access to web browsers. Additionally, they may lack the skills required to make use of such interfaces, but are already well-versed in how to communicate via SMS.

Since text-based systems are prone to user error (e.g. incorrectly entered commands, ignored messages, etc.), we need to allow the clinician to be aware of every interaction between the patient and the system, and be able to step in when things go awry. This point provided the necessity for an easy-to-use web interface that clinicians can use to monitor their patients without having to be trained in the use of a more complicated application, e.g. RapidSMS.

**Proposed Solution:** Provide a system which provides rich interactivity with users via SMS

**System Architecture**

The system consists of two principal components: the scheduler, the task manager. Supporting these components is the clinician web interface, which reads the state of the task manager from the database and adds events (technically, patient-task-date tuples) to the scheduler’s event queue. When an event is due, the scheduler sends an HTTP request to the task manager, which launches the task associated with the event for the specified user.

Tasks are represented in the system as state machines, which are driven from state to state primarily by incoming messages from users. The task manager acts as a dispatch, routing the messages to the appropriate state machine and facilitating the state machines’ replies to their respective users. At the moment state machines are hard-coded as Python modules, but in the future they will be editable from the clinician web interface. The messages which the state machines send are stored in the db and are editable from the clinician web interface.

**Implementation Notes**

- RapidSMS-powered
  Both the clinician web interface and task manager are based on RapidSMS, a popular framework for exchanging messages with users across multiple modalities (primarily SMS, but also supports email and various instant messaging networks). RapidSMS itself is implemented as a Django app, where Django is a framework for designing web-based Python applications.
- Clinician-driven Interactions
  At the moment, the clinician decides when a patient will be requested to provide information for a specific service. In the future, patients will be able to launch their own tasks for the purposes of self-reporting.
- Clinicians oversee the patient’s interaction with the system
  As the patient communicates with the system, the clinician should be available to provide direct support and to monitor the process for problems. To address this concern, the clinician web interface provides a comprehensive log of all interactions with the user (the “History” view), a calendar of dates on which requests and responses were sent, and finally an alert system that notifies the clinician at a single glance of any information or exceptional situations across all the patients under their supervision.

The diagram to the left illustrates the components that comprise the system as well as the flow of data and control throughout. Each actor in the system inhabits a color-coded zone: clinicians in red, patients in blue, administrators in green, and database administrators in purple. The center of the diagram is the system itself, and the dotted blue line separates the scheduler from the task manager and RapidSMS, which run in their own respective processes.

- Purple arrows indicate communication with the database.
- Red arrows indicate flow of command (e.g. execution, scheduling, sending and receiving messages).
- Blue arrows indicate process control.
- Black arrows simply indicate that the actor uses the interface to which the arrow points.