Sample Back-End Information

What follows are different ideas for back-end information, in the most general sense. They range from simple sources of information and diagnostic trees, to more complex plans or scripts for diagnosis. Some of these provide sample dialogues as well.

Feel free to use any or all of the information provided, or provide your own.
Attached are three ASCII files (malaria.txt, schistosomiasis.txt, and coccidioidomycosis.txt), each describing a disease. In each file, there is a section with the disease’s description, regions, symptoms, treatment, and prevention. The data is gleaned from relevant web pages at the US Centers for Disease Control (CDC), and is freely available for public use. The web pages themselves can be found at:

http://www.cdc.gov/travel/malinfo.htm
http://www.cdc.gov/travel/diseases/schisto.htm
http://www.cdc.gov/travel/diseases/coccidioidomycosis.htm

In addition, here are other web pages about the diseases. Please respect their copyright (see http://www.nlm.nih.gov/medlineplus/copyright.html).

Sample 2

We will be providing a small Java program that can be used as a back-end if desired. It is a program that reads in versions of the above (or other) ASCII files, and allows the user to receive answers to a few basic questions, e.g.:

- what are the diseases?
- what are all of the possible symptoms?
- what are the symptom synonyms? (e.g., "flu-like illness" and "influenza-like illness" are the same symptom)
- what are the characteristics of a specific disease?
- given a set of symptoms, what are the possible diseases, and what further symptoms/tests can narrow the diagnosis?

Our program is undergoing final testing, and we wanted to get the rest of these materials to participants as soon as possible. We will therefore be sending the back-end program shortly.
Here is a sample yes/no diagnostic tree one could follow to arrive at a diagnosis. “No” answers branch left, and “Yes” answers branch right. Terminal nodes are diagnoses.

```
Headache?
  / 
not sick Fever?
  / 
    allergies Travel outside US?
      / 
     Exposed to dust? Travel to India
       / \ E Asia, Middle East
      flu cocciod. Oceania?
          / \ Swimming in fresh water? malaria
       /   
     Exposure to dust? Blood in urine?
        /   
malaria cocciod. malaria schistos.
```

Here are two short examples of possible dialogues using the diagnostic tree. We do not claim that any existing dialogue manager (including ours) can carry out these exact dialogues; we merely offer them as ideas.

A really simple diagnostic interaction:

D: I understand you have headache. Have you had a fever?
P: Yes
D: Have you traveled outside the US in the past few months?
P: Yes, to India
D: You probably have malaria. We'll need to do a blood test to confirm.

Or more complex:

D: How are you feeling today?
P: Pretty terrible, I've had an awful headache
D: Do you have a fever?
P: I think so
D: Let's check...yes, your fever is 102F. Have you traveled anywhere recently?
P: Yes, I'm a reporter, I travel a lot
D: Where have you been in the past six months?
P: Thailand, South Africa, and Mexico
D: Did you ever swim or bathe in fresh water?
P: No
D: Were you taking anti-malarial drugs?
P: Yes
D: Were you exposed to dust, for example a construction site or mine?
P: Yes, I wrote a story on a major archeological site in Mexico
D: You probably have coccidioidomycosis. No treatment is required, but you are likely feel unwell for a few more days.
One of our team members, familiar with the COLLAGEN environment, offers a sample
recipe library for Collagen which follows a plan of first looking at symptoms, then taking a
"medical history" of the patient, and finally performing relevant diagnostic tests and reporting
a diagnosis. The library is attached (Recipes.coll). The library is not complete (it won't run
as is) but should give some idea of what a COLLAGEN task model for this problem might
look like. (We realize that the COLLAGEN team itself will develop its own unique
libraries).

In addition, here are two sample dialogues that might result from using this recipe library. We
have tried to make them sound more or less like they would if they were generated by
Collagen, so they are not human-like like the other example dialogues. The "tutorial" version
of the dialogue assumes that the agent is teaching the patient about what it is doing as it goes
through the process of diagnosis. It is not attempting to teach all the aspects of a disease, but
rather how you go about diagnosing it.

First sample diagnosis using recipe library:

S. "hello, I am the computer doctor. I will help you diagnose
your problem."
P. "I have a headache."
S. "Ok"
S. "do you have muscle aches?"
P. "yes"
S. "are you taking any medications right now?"
P. "yes, I'm taking aspirin for my headache and multivitamins"
S. "have you traveled outside of the country recently?"
P. "yes"
S. "where did you travel?"
P. "I went to India and South Africa"
S. "I'm going to take your temperature now"
P. "Ok"
S. takes temperature
S. "I'm going to take your blood pressure"
P. "Ok"
S. takes blood pressure
...
S. I'm going to check for blood in the urine"
P. "Ok"
S. Does urinalysis
...
S. "According to the information I have, you most likely
have malaria."
S. "Malaria can be cured with prescription drugs. The type of
drugs and
length of treatment depend on which kind of malaria is
diagnosed, where the patient was infected, the age of the
patient, and how severely ill the patient was at start of
treatment."

Second sample diagnostic tutorial dialogue using recipe library:

S. "hello, I am the computer doctor. I will help you diagnose
your problem."
S. "The first step is to find out your symptoms"
P. "I have a headache."
S. "Ok"
S. "do you have muscle aches?"
P. "yes"
S. "The next step is to consider drug interactions"
S. "are you taking any medications right now?"
P. "yes, I'm taking aspirin for my headache and multivitamins"
S. "Next we will consider your travel history"
S. "have you traveled outside of the country recently?"
P. "yes"
S. "where did you travel?"
P. "I went to India and South Africa"
S. "The next step is to find out if you have a fever."
S. "I'm going to take your temperature now"
P. "Ok"
S. takes temperature
S. "Your temperature is 103.4, indicating that you have a fever"
S. "Now I'm going to take your blood pressure"
P. "Ok"
S. takes blood pressure
...
S. "Now we need to do some lab tests"
S. "Since you have jaundice and fever we should check for blood in the urine"
S. "I'm going to do a urinalysis to check for blood in the urine"
P. "Ok"
S. Does urinalysis
...
S. "According to the information I have, you most likely have malaria."
S. "Malaria can be cured with prescription drugs. The type of drugs and length of treatment depend on which kind of malaria is diagnosed, where the patient was infected, the age of the patient, and how severely ill the patient was at start of treatment."
One of our team members volunteers on a search and rescue squad. Following are her thoughts on possible dialogues:

From my limited experience with first responder training, I learned about taking SOAP notes. In addition to first responders, nurses and doctors use SOAP as well. SOAP stands for "Subjective Objective Assessment Plan". Here's some detail:

http://www.vnh.org/SickcallScreeners/SOAPNotes.html

There are other online resources that detail SOAP better depending on whether they target EMS, nurses, doctors, mental health experts, etc. But the basic structure is the same: SOAP drives the interview process. Even for illnesses. First, the doctor does a primary survey. This is a quick head to toe examination to make sure there is nothing critically wrong. Depending on the circumstances, this may include working down the neck and spine to assess the potential for spinal injury and need for stabilization. Then the subjective interview follows. This precedes dealing with minor injuries since it is crucial to determining what may have happened. I would imagine this is just as important for diagnosing illnesses.

In addition to what you see on the webpage above, the doctor assesses mental ability. Another goal is to establish a trust relationship and to make the patient feel like everything is under control. So generally the doctor introduces herself and ask the patient his name. A simple way to check mental status is to ask: 1) who the patient is; 2) where he is; 3) what the time is; 4) what happened. But if the patient seems alert and there appears to be no sense that there has been a head injury or that the patient is anyway disoriented, these questions may be skipped.

So...here's what I imagine to be a relatively natural dialogue (minus any expert medial knowledge). It's important to realize that:

1) patients may offer a lot of information in one turn;
2) patients may answer a direct question but not meet the intent of the question (e.g., are you on medication and the patient has no prescription but actually took some medication);
3) patients may forget to mention relevant information;
4) doctors may need to ask negatives (to rule things out);
5) doctors may need to probe things like severity, duration and periodicity of pain, history, etc.
6) doctors may need to avoid priming the patient or always asking questions in the same way (make sure the patient has to think and doesn't keep saying "yes, yes, yes...")

D: Hi, I'm your E-doctor. Please call me, Dr. Ed. What is your name?
P: My name is Nancy.
D: Hi Nancy, What seems to be the problem.
P: Well, I've had a headache for about four days now.
D: Hmmm.
D: Do you get them often?
P: Every so often. But never so long.
D: Are you on any medication?
P: No.
D: No aspirin?
P: I've been taking aspirin.
D: Any allergies to medication?
P: No.
D: Any stiffness or soreness elsewhere.
P: Well, I have been feeling some stiffness in my neck and also when I wake up in the morning.
D: And how long have you had this.
P: I guess I've been feeling sore since I got the headache.
D: Is the pain continuous, or does it come and go?
P: It's pretty steady. I tried aspirin, but nothing seems to help.
D: On a scale of 1-10, how bad do you think the pain is?
P: About a 6, I guess.
D: Have you noticed any other sorts of problems since you've had the headache?
P: Well, I guess the stiffness in the morning... and I've been feeling itchy around my ankles and feet. And I've been coughing a little.
D: Have you experienced the itchiness before?
P: Only once when I used to swim in college.
D: Do you know what caused it then?
P: Not really, it went away.
D: Have you been swimming recently?
P: No. There's not much water in the desert!
D: You were in the desert?
P: I was on vacation there last week.
D: And you have a cough?
P: Yeah, a bit.
D: Any post-nasal drip or sore throat?
P: No. It's not like a cold.
D: I'd like to take your temperature.
P: okay.
D: You have a bit of a fever.
D: I'd like to take a chest x-ray and take a culture. It's possible you may have a cold, but also I'd like to screen you for Coccidiodomycosis. If so, it's not difficult to treat but we'd like to run some tests before going further.