* 1. Describe in your own words how the web works! In as much detail as you can, describe all the sequences of events that take place from the time a user presses Enter on the keyboard after typing in [www.rpi.edu](http://www.rpi.edu) into the address bar to when the webpage is finished rendering in the browser. Specifically, tell me in great detail the two protocols we discussed in class in action. (8 points)

# After we type in the URL and hit enter, the browser sends a request to the server, where the server will determine what the request is. The browser would want to reach the IP address of the server in order to load the content, and this requires the use of DNS, since the URL that we entered-www.rpi.edu-is obviously not in the format of an IP address. The main job of the DNS is to resolve names to IP addresses. The first step in the DNS protocol is a request to resolve a domain name. Then immediately, the local host will search in the local cache to see if the URL has been entered before and if the IP has already been requested in the past. If so, this saves us some time and the website load immediately since no further search needs to be done. However, if the IP address is not in the local cache, the next step is to reach out to the client’s internet service provider and go through a similar process—searching in the ISP’s cache. And if there is no success, the ISP will ask the root server, and if the root server couldn’t provide the address, it will redirect the ISP to another server that is lower in the DNS hierarchy, which in this case will be the top level server, and the one below is an authoritative server. If the address is eventually found on any of these servers, they will return to the local host and load that data, and that IP address will be stored in the local cache. However, if eventually the URL is not resolved, it will lead to an error message such as "This site can’t be reached. Check if there is a typo in www.sakdfgsahjdfsajerhmy.com." The other protocol is the HTTP protocol, which helps the client and the server communicate. It is the primary protocol for the transmission of information across the internet. HTTP is a request and response protocol in which the client makes a request to the server and the server issues a response with the requested content. The data, or webpage, that loads onto the client’s web browser after the DNS request is displayed through HTTP. However, now HTTPS is typically used over standard HTTP because HTTPS combines HTTP with SSL or TLS(modern version) to encrypt the information transferred between the client and the server.

* 1. Explain what is meant by a Universal Interface in a REST API. (5 points)

Universal Interface or Uniform Interface is one of the six constraints that defines the REST architecture. It defines the interface between the client and the server and allows either of them to work independently. Uniform Interface has four principles. First, any RESTful APIS are to be resource-based, which means individual sources are identified and are separate from the representation returned to the client; only the requested resource is returned. Second, the client should have enough information to modify the representation of the resource on the server if it has the permission. Third, each message must include enough clear information to allow the client to know what exactly to do without having to making interpretations. And lastly, Hypermedia as the engine of application state(HATEOAS)—clients need no prior knowledge to be able to interact with the application.

* 1. Explain how your browser chooses which CSS rule to apply to a tag in the case where there are multiple rules that could apply. (3 points)

CSS specificity is an algorithm that determines the property value to apply to selected element.

There are four categories which define the specificity level of a selector. In order, they are,

1. Inline styles—style applied directly to the element in the html file.
2. IDs—unique identifier that identifies the tag
3. Classes, attributes and pseudo-classes—non unique identifiers that identifies the tag
4. Elements and pseudo-elements

CSS will prioritize the styling of a tag in the above order from most important to least.

However, if the specificity is equal, then the styling is depending on the order of which line of code comes first, the most recent applies.

1.4 What command would you use to change the ownership of a file or directory on a Unix machine (such as your Azure VM)? Show me a complete command invocation to make a directory named /var/www/html be owned by a user named callab5. (4 points)

You would use the Chown command, which specifies the new owner of a particular directory/file.

sudo chown callab5 /var/www/html

Extra credit

In what year did Prof. Plotka graduate from RPI? What was his major?

1987, EE, CompSci, Math, MIS