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Started on	Wednesday, August 3, 2022, 8:27 AM
State	Finished
Completed on	Wednesday, August 3, 2022, 8:35 AM
Time taken	8 mins 36 secs
Marks	27.33/28.00
Grade	**97.62** out of 100.00

Question 1
Correct
1.00 points out of 1.00
Flag question

IRIS DMC Tutorial 3: IRIS Web Services

Over the past decade, IRIS has introduced a *web service* approach to obtaining data and metadata from the DMC. This has been a huge advancement in data access, but it may not be clear why if you are not sure what a web service is. Take a minute to do a web search on what a web service is. Based on these descriptions, what is a web service?

Select one:
- a. an automated application that can be monitored on a web page
- b. an interactive app on a webpage
- c. a web interface that allows access to an application ✓
- d. a webpage that can run your code

Check

Correct
Marks for this submission: 1.00/1.00.

Question 2
Correct
1.00 points out of 1.00
Flag question

This article summarizing IRIS web services was written in 2010, so it is dated particularly when it comes to the details of how services run now. However, it is still useful for understanding the overall importance of IRIS web services. What are the advantages of using web services for accessing information from the IRIS DMC.
If the web link is not responding, I have created a pdf copy here

Select one or more:
- a. they are relatively simple to understand and use ✓ 1 of 4 correct answers
- b. they use standard HTTP protocol technologies ✓ 1 of 4 correct answers
- c. they use network firewalls to restrict access
- d. they can be accessed with a wide range of programming languages ✓ 1 of 4 correct answers
- e. they make data more accessible to users beyond traditional seismologists ✓ 1 of 4 correct answers

Check

Correct
Marks for this submission: 1.00/1.00.

Question 3
Correct
1.00 points out of 1.00
Flag question

Now take a minute to review the current summary and description of available IRIS Web Services at http://service.iris.edu/
Which of the following can be obtained via IRIS web services?

Select one or more:
- a. The availability of seismic data ✓ 1 of 7 correct answers
- b. The distance between two locations ✓ 1 of 7 correct answers
- c. Station metadata ✓ 1 of 7 correct answers
- d. Earthquake locations ✓ 1 of 7 correct answers
- e. The predicted seismic wave travel time between two locations ✓ 1 of 7 correct answers
- f. Time series data ✓ 1 of 7 correct answers
- g. Synthetic seismograms ✓ 1 of 7 correct answers
- h. Earthquake focal mechanisms

Check

Correct
Marks for this submission: 1.00/1.00.

Question 4
Correct
1.00 points out of 1.00
Flag question

Click on the **station** web service link and take a minute to review the description of the options associated with this web service. Next click on the URL Builder button at the top of the page.

On the URL Builder page, choose Network: MU and choose Format: Text delimited to review the stations in our Miami University Seismic Network that you explored with the GMAP tool in the last assignment. I would recommend that you choose a Start After date under Advanced Search. Make sure to click the small box just to the right of "Start After" to activate the box. After that you should be able to enter a date. I would recommend that you enter 2012-01-01 because the Youngstown, Ohio magnitude 4.0 earthquake occurred on New Years Eve 2011, so this start date will allow you to see what stations we have deployed after that event made us a lot more interested in human induced seismicity in Ohio.

After you enter the parameters, you should see a yellow box towards the bottom of the page that says **Click the link:** and has a web address that we created by choosing the different options in the boxes on this web page. Copy and paste your link into this box to make sure you have the right link:

Answer: http://service.iris.edu/fdsnws/station/1/query?net=MU&sta=MUSK&level=station&format=text&startafter=2012-01-01&includecomments=true&nodata=404 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 5
Correct
1.00 points out of 1.00
Flag question

Now Click the link to see what it produces. Hopefully, it is the same set of stations you looked at in the last assignment using GMAP. How many stations does it list?

Answer: 6 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 6
Correct
1.00 points out of 1.00
Flag question

Which of the following information is provided across all of these stations?

Select one or more:
- a. Station name ✓ 1 of 4 correct answers
- b. Channels
- c. Start Time ✓ 1 of 4 correct answers
- d. End Time
- e. Location ✓ 1 of 4 correct answers
- f. Elevation ✓ 1 of 4 correct answers

Check

Correct
Marks for this submission: 1.00/1.00.

Question 7
Correct
1.00 points out of 1.00
Flag question

If we go back to the URL builder page and change the Level to Channel, which station produced the most lines in the output?

Answer: P49A ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 8
Correct
1.00 points out of 1.00
Flag question

Next we should examine when these stations actually have data available in the IRIS DMC as we learned in the last assignment that the general reporting of start and end dates of operation do not fully indicate when data is available. We can do that with the **availability** web service. Navigate to this web service page and find the URL Builder. Choose the MUG1 station from the MU network, and then choose a start and end date to examine the first half of 2020. This will allow you to see how the COVID-19 pandemic affected data reporting to the DMC at this site. When did the MUG1 station go offline for several weeks? You can use the YYYY-MM-DD format for Year, Month, and Day for this answer.

If the webservice output does not include information about the days when the station data was available, you may be on the URL Builder for the **station** webservice instead of the **availability** webservice. In this case, you should go to the main IRIS webservice page to choose the correct one: http://service.iris.edu/

Answer: 2020-03-17 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 9
Correct
1.00 points out of 1.00
Flag question

When did the station go back online again?

Answer: 2020-06-24 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 10
Correct
1.00 points out of 1.00
Flag question

For the rest of this assignment, we will be examining the 2002 Magnitude 7.9 Denali earthquake. This earthquake is noteworthy for the resulting strong ground shaking at large distances from the epicenter that triggered a variety of other phenomena. You can use the **event** web service to identify the precise details of this earthquake, which is different from the **station** and **availability** web services you have used. Using the URL Builder, set the Start Time to the beginning of 2002 and the End Time to the end of 2002. Set the Minimum Magnitude to 7.9 and the Output Format to Text. Then Click the link in the yellow box. What is the precise date and time of this earthquake? Please use the reported format in your answer: yyyy-mm-ddThh:ii:ss where y-year, m-month, d-day, h-hour, i-minute, s-second.

If you do not see a magnitude option, you If the webservice input does not include information about the magnitude, you may be on the URL Builder for the **station** webservice instead of the **event** webservice. In this case, you should go to the main IRIS webservice page to choose the correct one: http://service.iris.edu/

Answer: 2002-11-03T22:12:41 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 11
Correct
1.00 points out of 1.00
Flag question

What is the precise longitude of this earthquake?

Answer: -147.6114 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 12
Correct
1.00 points out of 1.00
Flag question

What is the precise latitude of this earthquake?

Answer: 63.6285 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 13
Correct
1.00 points out of 1.00
Flag question

What is the precise depth (km) of this earthquake?

Answer: 10.8 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 14
Correct
1.00 points out of 1.00
Flag question

A paper in Nature by Gomberg et al. (2004) discussed how this earthquake caused widespread triggering of local seismicity across Canada and the lower 48 United States. It describes several seismic stations where this was observed, with the strongest triggering occurring at station HLID in Idaho. We can look up key information about this station to be able to request data from it and estimate when the seismic waves were predicted to arrive at this station. Using the **station** web service URL builder as in previous questions (make sure it is NOT the **availability** web service), look up a station named HLID. Which Network does this station belong to? (*We are just looking for the 2-character network code*)

Answer: US ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 15
Correct
1.00 points out of 1.00
Flag question

Which 3-character channel of data at HLID is available for the north-south component of a broadband, 40-second sample-rate, weak-motion seismometer? Recall that you will need to choose **channel** for the Level of output information in the URL builder.

Answer: BHN ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 16
Correct
1.00 points out of 1.00
Flag question

To know when the seismic waves will arrive, we need to compare the location of the station to the location of the earthquake. Using the **station** web service URL builder as in previous questions, what is the longitude of HLID?

Answer: -114.4138 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 17
Correct
1.00 points out of 1.00
Flag question

What is the latitude of HLID?

Answer: 43.5625 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 18
Correct
1.00 points out of 1.00
Flag question

Next, you will need to calculate the distance from the earthquake to the station. You can do this using the **distaz** web service. Using the URL builder for **distaz**, what is the distance calculated by the web service?

Answer: 27.58641 ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 19
Correct
1.00 points out of 1.00
Flag question

What is the unit of distance provided by default for the **distaz** web service?

Select one:
- a. degrees ✓
- b. meters
- c. miles
- d. kilometers

Check

Correct

Marks for this submission: 1.00/1.00.

Question 20
Correct
1.00 points out of 1.00
Flag question

Next, you will need to calculate the time it takes for the P wave to travel from the earthquake to the station. You can do this using the **traveltime** web service. On the URL Builder page for **traveltime**, choose the Degrees option for the Distance parameter. For the distance that we obtained using **distaz**, what is the travel time in seconds for the first arriving P wave calculated by the web service?

Answer: 348.80

Check

Correct
Marks for this submission: 1.00/1.00.

Question 21
Correct
1.00 points out of 1.00
Flag question

Why is there more than one arrival for the P wave? Hint: You may want to review Linux Tutorial 10: Seismic Wave Travel Times and Ray Paths with TauP to refresh your memory.

Select one:

- a. A Discontinuity in the travel times results from triplications in the earth which tells us that the ray path went through 3 layers of the Earth.
- b. Attenuation in the travel times results from different ray paths which tells us about changes in seismic velocities from one layer to the next.
- c. A Shadow Zone results from discontinuities in the Earth which tells us that there are changes in seismic properties from one layer to the next.
- d. A Triplication in the travel times result from three different ray paths which tells us about changes in seismic properties from one layer to the next. ✓

Check

Correct
Marks for this submission: 1.00/1.00.

Question 22
Correct
0.67 points out of 1.00
Flag question

Now that we know the origin of the earthquake and the travel time for the P wave to arrive at the station, we can calculate when the precise date and time will be for the P wave arrival.

For most cases, you will want to review some seismogram before the P wave arrives to see the background noise, so I would suggest going 20 seconds earlier than the P wave arrival for this case. **With this in mind, what should you have as your starting time?**

Please use the reported format in your answer: yyyy-mm-ddThh:ii:ss

where y-year, m-month, d-day, h-hour, i-minute, s-second.

Answer: 2002-11-03T22:18:09

Check

Correct
Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.67/1.00**.

Question 23
Correct
0.67 points out of 1.00
Flag question

To request a seismogram, we also need to choose an End Time. For the End Time, add 20 minutes to your start time. What is this End Time using the reported format in your answer: yyyy-mm-ddThh:ii:ss where y-year, m-month, d-day, h-hour, i-minute, s-second?

Answer: 2002-11-03T22:38:09

Check

Correct
Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.67/1.00**.

Question 24
Correct
1.00 points out of 1.00
Flag question

Now we can use the **timeseries** webservice to see the seismogram for this station. Go to the **timeseries** URL Builder page and enter the Network, Station, and Channel information associated with station HLID from earlier questions. For the Start and End Times, use your answers to previous two questions (make sure to enter them in the right order). Once you enter all of the correct information, click the link to see a plot of this seismogram. Hopefully, one of the first things you will notice is that there is a gap of missing seismogram in this plot. This is not uncommon during very large earthquakes as the shaking can cause a disruption to the sensor, recorder, or communication. Approximately what time does this disruption first occur? Please use the simpler HH:MM:SS format for Hour, Minute, and Second for this answer.

Answer: 22:30:45

Check

Correct
Marks for this submission: 1.00/1.00.

Question 25
Correct
1.00 points out of 1.00
Flag question

To help alleviate this issue during our analysis, we should shorten the time frame of seismogram we look at to 15 minutes instead of 20 minutes. What is this End Time using the reported format in your answer: yyyy-mm-ddThh:ii:ss where y-year, m-month, d-day, h-hour, i-minute, s-second.

Answer: 2002-11-03T22:33:09

Check

Correct
Marks for this submission: 1.00/1.00.

Question 26
Correct
1.00 points out of 1.00
Flag question

Once you enter this revised End Time, you can Click the link to see a plot of this seismogram. Hopefully, now you will see a continuous seismogram. Approximately what time does largest amplitude occur at this station? You can use the HH:MM:SS format for Hour, Minute, and Second for this answer

Answer: 22:28:32

Check

Correct
Marks for this submission: 1.00/1.00.

Question 27
Correct
1.00 points out of 1.00
Flag question

Which seismic wave is producing the largest amplitude? If you are having trouble deciding, you may want to refresh your memory on reading seismic waves on seismograms here.

Select one:

- a. Body wave
- b. P wave
- c. Surface wave ✓
- d. S wave

Check

Correct
Marks for this submission: 1.00/1.00.

Question 28
Correct
1.00 points out of 1.00
Flag question

Next we will examine the locally triggered seismicity associated with the ground shaking due to this very large earthquake. The Gomberg et al. (2004) paper says they used a high pass filter above 2 Hz to examine the local seismicity. This type of filter only allows frequencies above 2 Hz to *pass* through the filter, meaning that it attempts to remove frequencies below 2 Hz. Using the timeseries URL builder, turn on the High-Pass Filter and enter 2 into the box to indicate the frequency cutoff. I would also recommend that you turn on the Remove Mean option, which helps the filter to behave properly. Then Click the link in the yellow box to see the filtered seismogram. Hopefully, you will see some high frequency energy associated with local seismicity. Approximately when does the prominent high frequency energy begin on the filtered seismogram? You can use the HH:MM:SS format for Hour, Minute, and Second for this answer

Answer: 22:27:22

Check

Correct
Marks for this submission: 1.00/1.00.

Finish review