Load Runner Interview Questions

1. **What is Performance testing?**
   Performance testing is evaluating the system performance under virtual user load.

2. **What are the different types of performance testing?**
   Performance testing can be of different types like:

   - Load Testing
   - Endurance/Soak/Duration Testing
   - Scalability Testing
   - Volume Testing
   - Stress Testing
   - Failover testing

3. **What is a Server?**

   Software (Program) or Hardware which

   - Understands your request
   - Process your request
   - Send the response back

   Any s/w which is capable of doing the above is called server.

   But software alone cannot run on its own and it needs hardware support. So combination of both is called Server.

4. **What is a protocol?**

Protocol is nothing but "Set of rules"
Depending on the kind of communication required between client and server, protocol is selected by Architect

5. **Difference between load test and stress test?**
    Load testing is all about testing the application performance under expected load
    Stress testing is all about testing the system beyond its capacity to identify the break point of the system.

6. **What is the important information to be gathered from application team or client or BA before you start working on any project?**
    Below are some of the important questions to be asked before you start working on any project.

    - What are critical business Scenarios to be tested?
    - What are Target Volumes (Users and iterations or Transactions per hour)
    - What are the expected average response times or SLA?
    - What are the types of tests to be executed like load, soak etc.
    - Which Protocol or communication mechanism they implemented for the application?
    - Request to provide Application Architecture
    - Detailed information about Servers' configurations
    - Is there any Test data dependency?
    - Is Performance Testing environment a replica of Production environment?
    - What are the testing timelines?
    - Is there any proxy?
    - Is the load balanced?

7. **How do you gather information regarding target volumes to be achieved if your client doesn't know anything about performance testing?**

To answer the above question, we may need to explain 3 scenarios:

Scenario 1:

If the application is already in production:

If the application is already in production, then we should get the historical data (may be for last 6 months or 1 year) by using data analytical tools like Splunk, SQL etc and analyze the data.

For ex: in the last 1-year, which month, which date and which hour was the application most busy. Ie, when was the last time that more number of users accessed the application, how many page views? Etc.

Scenario 2:

If application is NOT in production and also client doesn't know anything about performance testing.

Because the application is NOT in production, we may have to get the competitor statistics by using some network traffic utilities like alexa.com and analyze page views, locations from which they are accessing the application, etc.

Scenario 3:

If application is NOT in production and also client doesn't know anything about performance testing and No Competitor in the market

Because there is no competitor in the market, it is very tough to gather data.

Best solution will be to discuss with Client or product owner or BA to understand the core business and get some initial data based on assumptions.

For ex: Let's say application is related to food delivery and there is no competitor. Understanding core business means getting some initial information on how many customers are currently buying food at nearby delivery stores and what percentage of customers might shift to online application, what are its peak hours etc.

Possible follow up question:

Have you ever gathered data for scenario 3 mentioned above?

Ans: There was an application for which client didn't provide any data. However, I have discussed with Business Analyst and application team to finalize the target volumes. (Reaching out to client was not possible directly in our project).

8. **Have you worked on test plan document?**

   Yes, I have updated test plan document for the recent project. It contains some of the important sections to be updated like test objective, Application Architecture, Business scenarios to be tested, types of testing to be performed, Resources to work on the project, tools to be used for testing, testing timelines, Environment to be tested, Entry Criteria, Exit Criteria, Risks and Assumptions etc.

9. **What is Work Load Modelling?**

   Work Load Modelling (WLM) is a document which consists of information related to what needs to be tested and the approach used to achieve the target. In simple words, we do work load modelling to calculate Pacing.

10. **How did you calculate Pacing?**

    Pacing was calculated using Little's law formula.
    Formula is : **N=X*(RT+ZT+Pacing)**
    Where N= No of users
    X= TPS
    RT=Response Time
    ZT= Think Time
    RT+ZT can be called as SET (Script Execution Time)
    Note: N and X values are provided by Client
    Script execution time is calculated by simply running the developed script in vugen for 2-3 times and taking average elapsed time out of executions.

11. **What is thinktime and Pacing?**

    Think time is a wait time or time gap between two transactions.
    Pacing is wait time or time gap between two iterations.

12. **What are the protocols that you have worked so far?**

    Just mention the protocols you worked or have knowledge. For ex: I have worked on 3 protocols so far which includes Web HTTP/HTML, Truclient, Webservices.

13. **What is difference between HTML vs URL based recording?**
    Some of the important differences are as below:

    - The number of lines of code generated by HTML mode of recording is greater than the number of lines of code generated by URL mode.
    - As per above point, Script maintenance is easy with HTML based recorded script. Script maintenance is tough in URL based recording mode.
    - HTML mode doesn't require much correlation efforts when compared with URL based mode.
    - HTML mode is related to context-based recording and URL mode is context less recording (every resource will have independent requests generated).

14. Concurrent Users vs Simultaneous Users?

Users who are keeping the load against the application is called Concurrent users.
Users who are performing the same transaction at the same time are called
Simultaneous users.

15. What are the different components of Load Runner? Or What is the Load Runner architecture?

Load Runner has following components:

Load Generators: These are highly configured machines which are which are
responsible to generate and run vusers to put load on the system.

Vugen: Vugen is a component which is used to develop performance scripts.

Controller/Performance Center: It is used to upload scripts, Schedule run options,
assign LG's and monitor execution results.

Analysis: It helps us to view and compare test results.

Agent process: This component is responsible to communicate between Controller
and Load Generator.

16. What is Correlation?

As part of the recorded script, we might have dynamic values which are unique for
every run or for every user such as session ID's or unique ID's. process of capturing
these unique values is called correlation. Below are the frequently used methods:

> Web_reg_save_param_ex();
> Web_reg_save_param_regexp();

17. What could be the reason for correlation failure?

Generally, we might see below error during correlation function.

Error -26377: No match found for the requested parameter "correlationparameter".
Either the specified boundaries were not found in the response or the matched text
is longer than current max html parameter size of 256 bytes. The total length of the
response is 48338 bytes. You can use "web_set_max_html_param_len" to increase
the max parameter size.

Below are the 4 reason why correlation might fail:

- Invalid LB and RB
- The placement of web_reg_save_param_ex function might be wrong
- Value you are trying to capture might be more than 256 characters
- The actual value itself might not be in the response.

18. Write a correlation function which will capture the entire response.

To capture entire response, we need to give blank value for both LB and RB

For ex: **web_reg_save_param_ex("ParamName=c_param","LB=","RB=",LAST);**
Note: Entire response might be greater than 256 characters. Hence, You need to write below function at the start of the script which will allocate memory to LR variable.
Web_set_max_html_param_len("1024");

19. How do you find LB and RB for a dynamic value?
We can find LB and RB using below options:
- Code generation log
- Snapshot view
- Capture entire response using empty LB and RB and then identify LB and RB
- We can also use view source option in page view.

20. How many ways you can correlate a dynamic value?
- **Auto Correlation**
- **Manual Correlation.**

For our scripts we will use manual correlation which is more reliable in long run.

21. What is regular expression and how did you use in correlation?

A regular expression is a sequence of characters that specifies a search pattern in text.
We will use **web_reg_save_param_regexp()** function to implement regular expression in correlation concept in LR.
For ex: below is the sample data
/*<option value="Paris">Paris</option>
<option value="Portland">Portland</option>
<option value="San Francisco">San Francisco</option>
<option value="Seattle">Seattle</option>
<option value="Sydney">Sydney</option>
<option value="Zurich">Zurich</option>*/
If you want to capture city names then below is the correlation function to be used:

```
web_reg_save_param_regexp(
    "ParamName=c_City",
    "RegExp=<option (value=)\"([A-Z,a-z, ]+)\">([A-Z,a-z, ]+)</option>",
    "Ordinal=ALL",
    "Group=2",
    LAST);
```

Another way:

```
web_reg_save_param_regexp(
    "ParamName=c_City",
    "RegExp=<option value=\"(.*)\">",
    "Ordinal=ALL",
    "Group=1",
    LAST);
```

22. How to capture a dynamic value if LB and RB are not present?

If LB and RB aren't present then we can use previous line static text as LB and next line static text as RB.

23. Can we capture CAPTCHA or OTP values using correlation functions?

NO. We cannot capture Captcha or OTP values using correlation rather you can ask developer to comment that functionality or pass any hard coded value for testing purpose.

24. What are the different checkpoints used in LR?

Text Check point and Image check point are widely used checkpoints in LR.
However, we can even capture response size and response codes and validate.

25. What are the functions used for text check point and image check point?

Web_reg_find(); is a function used to validate text checks.
Web_image_check() is a function used to validate images.

Web_reg_find() must be written before the request and web_image_check() must be written after the request.
Note: option "Enable Image and Text Checks" must be checked in run time settings -> preferences to run web_image_check function.

26. What are the functions to be used to verify download size and response codes?

web_get_int_property(HTTP_INFO_DOWNLOAD_SIZE);
web_get_int_property(HTTP_INFO_RETURN_CODE);

27. What is the purpose of "SaveCount" arugument in web_reg_find()?

Savecount will save the number of occurrences of the text to be searched in response.

```
web_reg_find("Text=Welcome","SaveCount=count",LAST);


web_submit_data("login.pl",
    "Action=http://localhost:1080/cgi-bin/login.pl",
    "Method=POST",
    "TargetFrame=body",
    "RecContentType=text/html",
    "Referer=http://localhost:1080/cgi-bin/nav.pl?in=home",
    "Snapshot=t9.inf",
    "Mode=HTML",
    ITEMDATA,
    "Name=userSession", "Value={c_userSession}", ENDITEM,
    "Name=username", "Value={p_userName}", ENDITEM,
    "Name=password", "Value={p_password}", ENDITEM,
    "Name=login.x", "Value=55", ENDITEM,
    "Name=login.y", "Value=5", ENDITEM,
```

```
"Name=JSFormSubmit", "Value=off", ENDITEM,
LAST);
```
Text welcome will be searched in the response of above request and count will be updated with number of occurrences of word welcome in the response.

28. What rendezvous point?
All the users waiting at certain point to hit the request at the same time is called rendezvous point.
lr_rendezvous(); is the function we use to implement.

29. What is Throughput?
The number of transactions produced over time during a test. It is calculated as bytes/sec.

30. What is response time?
The time taken by the system in sending the request and receiving the response from server is called response time.

31. What is the relation between Response Time and Throughput?
Both are inversely proportional. If Throughput increases then response times should not increase.

32. What is a protocol?
A set of rules or communication mechanism between 2 or more systems.
Most frequently used protocols are WEB HTTP/HTML, WEBSERVICES, TRUCLIENT etc.

33. How do you identify memory leaks/bottlenecks in a system?
We can identify memory bottlenecks in a system by running an endurance test for longer duration like 5hrs, 8hrs, 1day etc. Basically, the RAM will increase and may lead to application crash.

34. What is thinktime and Pacing?
Think time is a wait time or time gap between two transactions.
Pacing is wait time or time gap between two iterations.

35. How do you identify the bottlenecks after running a performance test?
Performance bottlenecks can be identified by analyzing different performance counters such as response times, Throughput, hits per second etc.

36. How do you identify the candidates for correlation and Parameterization?
Values which are changing dynamically every time we run the script needs to be correlated.

Values which are given as input by user while recording the script and have to be run many iterations needs to be parametrized.

37. What is ramp up and ramp down?

The rate at which we increase the load on system by adding virtual users is called ramp down.

The rate at which virtual users exit the system is called ramp down.

38. How many sections are there in Vugen solution explorer?

There are three sections as mentioned below.

a. Vuser init
b. Action
c. Vuser end

Note: We cannot rename or delete the vuser init and vuser end.

39. What is difference between performance testing and performance engineering?

Performance testing is a process where we identify the bottlenecks in the system. Performance engineering is not only identifying the bottlenecks but also rectifying the problem and taking it to closure.

40. What are the logging options in vugen?

There are 2 types of log options.

a. Standard log
b. Extended log

Standard log creates a log of functions and messages sent during script execution.
Extended logs create additional logs including warnings, messages, parameterized values etc.

41. What is lr_abort in LR?

It will end the execution if any error occurs. We need to uncheck "continue or error" in Run Time Settings.

42. What is lr_paramarr_random()?

This function is used to pick any random value from correlation parameter and pass it in subsequent requests.
Note: We must use Ordinal=ALL in the correlation function

```
web_reg_save_param_ex("ParamName=c_Flight","LB=outboundFlight\" value=\"","RB=\"","Ordinal=ALL",LAST);

lr_start_transaction("WebTours_S01_BookTicket_T04_Click_ContinueButton_FindFlightsPage");

web_submit_data("reservations.pl",
    "Action=http://localhost:1080/cgi-bin/reservations.pl",
    "Method=POST",
    "TargetFrame=",
    "RecContentType=text/html",
    "Referer=http://localhost:1080/cgi-bin/reservations.pl?page=welcome",
    "Snapshot=t10.inf",
    "Mode=HTML",
    ITEMDATA,
    "Name=advanceDiscount", "Value=0", ENDITEM,
    "Name=depart", "Value={p_departureCity}", ENDITEM,
    "Name=departDate", "Value={p_departureDate}", ENDITEM,
    "Name=arrive", "Value={p_arrivalCity}", ENDITEM,
    "Name=returnDate", "Value={p_arrivalDate}", ENDITEM,
    "Name=numPassengers", "Value=1", ENDITEM,
    "Name=seatPref", "Value=None", ENDITEM,
    "Name=seatType", "Value=Coach", ENDITEM,
    "Name=.cgifields", "Value=roundtrip", ENDITEM,
    "Name=.cgifields", "Value=seatType", ENDITEM,
    "Name=.cgifields", "Value=seatPref", ENDITEM,
    "Name=findFlights.x", "Value=44", ENDITEM,
    "Name=findFlights.y", "Value=13", ENDITEM,
            LAST);

lr_end_transaction("WebTours_S01_BookTicket_T04_Click_ContinueButton_FindFlightsPage",LR_AUTO);

Flight=lr_paramarr_random("c_Flight");
lr_save_string(Flight,"Flight");
```

43. What is lr_exit() function?

It will exit the iteration or action.

Some of the arguments to be passed are:

LR_EXIT_ACTION_AND_CONTINUE

LR_EXIT_ITERATION_AND_CONTINUE

For ex:

```
web_reg_find("Text=Welcome","SaveCount=count",LAST);

  web_submit_data("login.pl",
    "Action=http://localhost:1080/cgi-bin/login.pl",
    "Method=POST",
    "TargetFrame=body",
    "RecContentType=text/html",
    "Referer=http://localhost:1080/cgi-bin/nav.pl?in=home",
    "Snapshot=t9.inf",
    "Mode=HTML",
    ITEMDATA,
    "Name=userSession", "Value={c_userSession}", ENDITEM,
    "Name=username", "Value={p_userName}", ENDITEM,
    "Name=password", "Value={p_password}", ENDITEM,
    "Name=login.x", "Value=55", ENDITEM,
    "Name=login.y", "Value=5", ENDITEM,
    "Name=JSFormSubmit", "Value=off", ENDITEM,
    LAST);

if(atoi(lr_eval_string("{count}"))==0)
{
lr_exit();
}
```

44. What is lr_stop_transaction() and lr_resume_transaction()?

If you want to pause transaction and resume again between start and end transactions then we can use lr_stop_transaction and lr_resume_transaction functions.

45. What is lr_save_string and lr_save_int?

lr_save_string and lr_save_int will assign variable value to LR parameter.
For ex:
Char *str;
Str="LoadRunner";
lr_save_string(str,"str");

int i;
i=10;
lr_save_int(i,"i");
Note: LR parameter can be any of any name. To avoid confusion, we can give the same name as c language variable as mentioned above.

46. What is lr_eval_string();

lr_eval_string will read the value present in the embedded parameter.
For ex:
Char *str;
Str="LoadRunner";
lr_save_string(str,"str");
lr_output_message("%s", lr_eval_string("{str}"));
output is : LoadRunner

47. What is lr_paramarr_idx()?

Returns the parameter value at a specified location.
For ex: Let's say there is a correlation parameter which contains all city names.
```
web_reg_save_param_ex("ParamName=c_City","LB=option value=\"","RB=\">","Ordinal=ALL",LAST);

    web_url("Search Flights Button",
        "URL=http://localhost:1080/cgi-bin/welcome.pl?page=search",
    "TargetFrame=body",
    "Resource=0",
    "RecContentType=text/html",
    "Referer=http://localhost:1080/cgi-bin/nav.pl?page=menu&in=home",
    "Snapshot=t10.inf",
    "Mode=HTML",
    LAST);
```

"c_City" contains all city names like
C_City_1=Frankfurt,
C_City_2= Denver,
C_City_3=London

Task is to find out if London is present in the list or not where we can use lr_paramarr_idx.

```
icount=0;

  cityCount=atoi(lr_eval_string("{c_City_count}"));

  for(i=1;i<=cityCount;i++)
  {
    strCity=lr_paramarr_idx("c_City",i);
    if(strcmp(strCity,"London")==0)
    {

      icount=1;
      break;
    }

  }

  if(icount==1)
  {
    lr_output_message("London is found");

  }
  else
  {
    lr_output_message("London is NOT found");
  }
```

48. **What is lr_continue_on_error()?**
    When error occurs, Script will continue based on the below options:
    lr_continue_on_error(0); No Option
    lr_continue_on_error(1); Continue
    lr_continue_on_error(2); Skip to Next Action
    lr_continue_on_error(3); Skip to next iteration
    lr_continue_on_error(4); End user

49. **What is web_save_timestamp_param()?**
    This function will save the timestamp to a parameter. Generates a 13 digit timestamp in milliseconds.
    web_save_timestamp_param("timestamp",LAST);
    lr_output_message("%s", lr_eval_string("{timestamp }"));

50. **What is web_set_proxy()?**
    This function ensures that all requests are redirected to a specific proxy server.
    Ex: web_set_proxy(12.25.0.10:443);
    443 is default port number for https request

51. **What is web_set_user?**
    If the authentication is required to access the web server, then mostly, we need to use web_set_user function to submit the credentials.
    When you record an application vugen will generate a function called web_set_user where credentials need to be passed correctly along with domain name.
    web_set_user("userid","password","domainabc.com");

52. What is web_set_certificate_ex();

In order to access the application if any certificate is required then we need to use web_set_certificate_ex() function.

```
web_set_certificate_ex(
    "CertFilePath=cert1.pem",
    "CertFormat=PEM",
    "KeyFilePath=key1.pem",
    "KeyFormat=PEM",
    "Password=abcd",
    LAST );
```

Note: Certificate file extension should be PEM.

53. What is web_set_socket_option?

Used to set socket level options for the request.

```
web_set_sockets_option("SSL_VERSION", "AUTO");
```

Instead of auto, you can use any specific versions as well.

54. How to read and write from file?

```
//How to read data from the file

//Open The file
//verify if there is any data or not // check if the file is empty or not
// read all the usernames if not empty
//close the file


FileVariable=fopen(FileLocation,"r");
if(FileVariable!=NULL)
{
  //while(!feof(FileVariable))
  for(i=1;i<=20;i++)
  {
      fgets(userNames,100,FileVariable);
      lr_output_message("%s",userNames);
  }

  fclose(FileVariable);
}
//How to write data?

  FileVariable=fopen(FileLocation,"a");
      fprintf(FileVariable,"%s \n",lr_eval_string("{p_userName}"));
      fclose(FileVariable);

In globals.h, give the file location path and declare variables.
```

55. What are the frequent errors observed during load tests?

```
400 bad requests
404 Page not found
401 Unauthorized error
500 Internal Server error
502 Bad gateway error
504 Gateway Timeout error
503 Service unavailable error
200 Success response
```

56. **What is the reason for heap utilization reaching 100%?**

    When Garbage collection mechanism don't work as expected, Heap utilization increases and may reach 100%. We need to work with development team and analyze heap dumps to find out if there is any memory leakage happened.

57. **What is the alternative if you are unable to record script through vugen?**

    We can use Fiddler or f12 developer tools or Blazemeter.

58. **What is the frequent error that you observed when using truclient protocol?**

    Object identification and synchronization is most important in truclient. Hence, we see object not found issues frequently.

59. **What are the metrics that you capture from APM tool?**

    We have used Appdynamics in our project and below are some of the metrics that we captured.
    - Heap utilization
    - CPU utilization
    - Memory utilization
    - Disk I/O
    - Slow Methods
    - Slow database calls
    - Calls per minute
    - Errors or Exceptions