

Full Stack Developer – Screening Questions

Thanks for applying for a position with KZN! The following assessment is designed to help assess your knowledge and skills across several areas.

Test Instructions

This test is designed to be taken individually over a 2 hour period without assistance from the internet. Do not worry if you are unable to complete all the questions in the given time.

If you do not know the answer to a question, leave it blank and come back if you have remaining time.

When you're done

Send us an email to talent@kzn.io including the following:

- Your name
- Answers to the questions
- Time taken to complete the test
- Source code to the programming questions

We'll aim to review your assessment and get back to you within a week of receiving your submission.

General Questions

The following questions are designed to test your knowledge and logic skills across a wide number of areas.

Question 1

What would be the result after the following pseudo-code is executed?

```
I = 7
A = 2
WHILE I > 0
BEGIN
    A = A * 2
    I = I - 1
END
PRINT A
```

Question 2

Briefly describe the difference between a HTTP GET and HTTP POST request. Why might you use one over the other?

Question 3

Briefly describe at least two methods by which two processes on the same machine could communicate.

Question 4

What would be the result after the following pseudo-code is executed?

```
A = 1
I = 10
DO
    A = A + A
    I = I + 1
WHILE I > 0
PRINT A
```

Question 5

What is the effect of running the following command?

```
tail -f /var/log/syslog
```

Question 6

What is the correct JavaScript syntax to change the content of the HTML element below?

```
<p id="demo">Leroy Jenkins was a young fool who changed hearts and minds</p>
```

- a) `#demo.innerHTML = "Hello World!";`
- b) `document.getElementById("demo").innerHTML = "Hello World!";`
- c) `document.getElement("p").innerHTML = "Hello World!";`
- d) `document.getElementByName("p").innerHTML = "Hello World!";`

Question 7

What part of the string would match the regular expression?

Input string kekekekelllloooooooooooooooooolzergrush
Regular Expression `^[ke]+[a-z]{4}`

Question 8

Which of the following CSS classes would apply a background to all h3 elements?

- a) `h3.all { background-color:#FFFFFF; }`
- b) `h3 { background-color:#FFFFFF; }`
- c) `all.h3 { background-color:#FFFFFF; }`

Question 9

Briefly describe the difference between TCP and UDP. Why might you use one over the other?

SQL

The following section will ask you to write several database queries. Your answers may use vendor-specific extensions to the SQL standard, however they should be avoided if possible.

Question 10

Write an SQL query to create a table named `staff` including the following information:

- `name` - string type, length up to 255 characters
- `employee_type` - string type, length exactly 1

- `tax_file_number` - string type, length exactly 9, unique, optional

Question 11

Write an SQL query to show the number of rows in the `product` table

Question 12

Write an SQL query to show the number of rows in the `product` table where the `widget_type` has the value `dongle`

Question 13

Write an SQL query to insert the following row into the `product` table

sku	widget_type	name	description	price	in_stock
GM6000	dongle	Gruntmaster 6000	Software upgradable to the Gruntmaster 9000	12.45	Y

Question 14

Write an SQL query to set the `in_stock` column to N for all items in the `product` table where the `widget_type` is `sprocket`

Question 15

Given the following, write an SQL query to show how many customers with type `individual` have a corresponding attribute named `date_of_birth`?

- table `customer` exists with columns
 - `customer_id` (numeric type)
 - `name` (string type)
 - `type` (string type)
- table `customer_attribute` exists with columns
 - `customer_id` (numeric type)
 - `attribute_name` (string type)
 - `value` (string type)

Question 16

Marketing is running a promotion and would like you to find the first 10 business customers that signed up during the promotional period of July 1st and August 31st. Write an SQL query to accomplish this which uses an attribute named `signup_date`.

Short Answer

Question 17

You have been asked to look at a PHP web application that is running slowly. The application runs on a Linux server using MySQL database and Apache web server.

Outline what general steps you might take to ensure the application can handle traffic loads, including any questions you might ask.

Question 18

A client has asked you to complete a proof of concept / prototype application. Your first estimate to the client indicated the task would take 4 weeks, however after getting started you realise the task is much simpler and will only take 2 weeks.

Choose the most appropriate course of action from the list below and briefly explain your choice:

- a) Deliver the solution to the client early and stop work.
- b) Spend the additional 2 weeks developing tests and documentation for the solution.
- c) Ask the customer for more features to implement in the remaining time.

Programming Exercises

Please complete as many of the following exercises as possible within the assessment time. You may use any of the following languages, and are free to mix and match which language you use for each problem.

- Python
- Go
- NodeJS
- C#
- Java
- Ruby
- PHP
- Perl
- C/++
- *NIX Shell scripting

Question 19

Write a command line program that accepts a string value as an argument and outputs the reverse of that string.

Example Invocation

```
./program Hello
olleH
```

Question 20

Write a command line program that accepts an optional integer value *N* as an argument and outputs each whole number between 1 and *N* (inclusive), separated by a single space character. If no value is provided for *N*, the default value should be 100.

When outputting each number, if it is:

- a multiple of 3, print *F* instead of the number
- a multiple of 5, print *B* instead of the number
- a multiple of both three and five, print *FB* instead of the number

Example Invocation

```
$ ./program 100
1 2 F 4 B F 7 8 F B 11 F 13 14 FB 16 17 F 19 B F 22 23 F B 26 F 28 29
FB 31 32 F 34 B F 37 38 F B 41 F 43 44 FB 46 47 F 49 B F 52 53 F B 56
F 58 59 FB 61 62 F 64 B F 67 68 F B 71 F 73 74 FB 76 77 F 79 B F 82
83 F B 86 F 88 89 FB 91 92 F 94 B F 97 98 F B
```

Question 21

Write a command line program that accepts a filename as the only argument. For each input line in the file, the program must produce an output line showing the most frequently occurring character and the number of times it occurred. Capitalised characters must be treated separately from their lowercase equivalents.

Example Invocation

```
$ ./program file.txt
```

```
a 1
b 3
A 3
o 7
```

Example file

```
a
abbbc
aAAAbbBcdef
o, bacon ipsum dolor amet prosciutto cow alcatra beef ribs!
```

Question 22

Write a command line program that accepts a string value argument and outputs the longest palindrome within that string. A palindrome is any sequence of characters that reads the same backwards as forwards.

Example Invocation

```
$ ./program letter
ette
```

Example Invocation

```
$ ./program racecar
racecar
```

Example Invocation

```
$ ./program eleloool
loool
```