Assignment 9

The due date for submitting this assignment has passed. Due on 2020-04-01, 23:59 IST.
As per our records you have not submitted this assignment.

Common data for question 1 to 5

Match the CUDA and OpenCL corresponding terms-

<table>
<thead>
<tr>
<th>CUDA terms</th>
<th>OpenCL terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>scalar core</td>
<td>i) private memory</td>
</tr>
<tr>
<td>thread</td>
<td>ii) processing element</td>
</tr>
<tr>
<td>thread-block</td>
<td>iii) compute unit</td>
</tr>
<tr>
<td>shared memory</td>
<td>iv) work-item</td>
</tr>
<tr>
<td>local memory</td>
<td>v) local memory</td>
</tr>
<tr>
<td></td>
<td>vi) work-group</td>
</tr>
</tbody>
</table>
1) Options for scalar core:
   a) i
   b) ii
   c) iii
   d) iv
   
   a.
   b.
   c.
   d.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   b.

2) Options for thread:
   a) i
   b) ii
   c) iii
   d) iv
   
   a.
   b.
   c.
   d.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   d.

3) Options for thread-block:
   a) iii
   b) iv
   c) v
   d) vi
   
   a.
   b.
   c.
   d.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   d.
4) Options for shared memory:
   a) i
   b) iv
   c) v
   d) vi

   No, the answer is incorrect.
   Score: 0
   Accepted Answers: c.

5) Options for local memory:
   a) i
   b) iv
   c) v
   d) vi

   No, the answer is incorrect.
   Score: 0
   Accepted Answers: a.

6)
State which of the following statements are true.

i) OpenCl context keeps track of the memory and programs objects that are created for each device.

ii) For single device, OpenCl context is not required

iii) Command-queue to co-ordinate execution of the kernels on the devices

iv) Host can have access to local memory at run-time

v) OpenCL allows synchronization across different work-groups.

Options

a) i, iii

b) ii, iii, iv

b) i, iv

d) i, iii, v

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

7)

Fill in the blanks with correct options given below for the following OpenCL host code snippet.
Assume the target hardware has one Intel CPU and one AMD GPU.

```c
cl_uint numPlatforms;
cl_int status = ______________(A)__________ ;
if (status != CL_SUCCESS)
{
  printf (" Found no platform !\n") ;
  return FAILURE;
}
cl_platform_id Platform [ numPlatforms ] ;
status = ______________(B)__________ ;
cl_device_id all_devices [2] ; //Since target hardware has two devices
//store the GPU device at index0 and CPU at index1
for (i = 0; i < numPlatforms ; i++)
```

https://onlinecourses.nptel.ac.in/noc20_cs41/unit?unit=35&assessment=130


```c
{
    cl_uint numDevices;
    status = clGetDeviceIDs ( platforms [i],
    CL_DEVICE_TYPE_GPU , 0, NULL , & numDevices);
    if(numDevices>0)
        status = __________(C)_________
    status = __________(D)_________
    if(numDevices>0)
        status = __________(E)_________
}

Choices
i) clGetDeviceIDs ( Platform [i] , CL_DEVICE_TYPE_CPU , numDevices
    ,all_devices [ 1 ] , NULL );

ii) clGetDeviceIDs ( Platform [i] , CL_DEVICE_TYPE_GPU , numDevices
    ,all_devices[0],NULL)

iii) clGetPlatformIDs(0, NULL, &numPlatforms)

iv) clGetDeviceIDs ( platforms [i] , CL_DEVICE_TYPE_CPU , 0, NULL , &
    numDevices );

v) clGetPlatformIDs ( numPlatforms , Platform , NULL )

Options:
   a) A-> ii , B-> iv , C-> v , D-> iii , E->i
   b) A-> iv , B-> v , C-> i , D-> ii , E->iii
   c) A-> i , B-> ii , C-> iii , D-> iv , E->v
   d) A-> iii , B-> v , C-> ii , D-> iv , E->i

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.
8)

20 points
```
The two input matrices for a matrix multiplication kernel (tiled version) implemented in OpenCL have size 1024X2048 and 2048X4096. The TILE size used is (32,32). The target hardware can accommodate 1024 threads at max per block.

For the following OpenCL command what will be the content of the arrays `global_work_size` and `local_work_size`.

```c
err = clEnqueueNDRangeKernel (commands, mat_mul, 2, NULL, &global_work_size, &local_work_size, 0, NULL, NULL);
```

**Options**

a) `global_work_size = {32,128,1}`, `local_work_size = {32,32,1}`

b) `global_work_size = {1024,4096,1}`, `local_work_size = {32,32,1}`

c) `global_work_size = {2048,2048,1}`, `local_work_size = {32,32,1}`

d) `global_work_size = {64,64,1}`, `local_work_size = {32,32,1}`

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

9) Consider a 1D Naive Reduction Kernel calculating the sum of $2^{22}$ elements. The maximum size of a work group that can be launched is 512. The kernel is invoked multiple times. What is the content of the arrays `global_work_size` and `local_work_size` when the kernel is invoked in the third iteration.

```c
err = clEnqueueNDRangeKernel (commands, reduction, 1, NULL, &global_work_size, &local_work_size, 0, NULL, NULL);
```

**Options**

a) `global_work_size = {8192,1,1}`, `local_work_size = {512,1,1}`

b) `global_work_size = {512,1,1}`, `local_work_size = {512,1,1}`

c) `global_work_size = {1,1,1}`, `local_work_size = {16,1,1}`

d) `global_work_size = {16,1,1}`, `local_work_size = {16,1,1}`

No, the answer is incorrect.
Score: 0
Accepted Answers:

d.