1.1.3 Synchronization

The two domains of synchronization in OpenCL are work-items in a single work-group and command-queue(s) in a single context. Work-group barriers enable synchronization of work-items in a work-group. Each work-item in work-group must first execute the barrier before executing any beyond the work-group barrier. Either all of, or none of, the work-items in a work-group must encounter the barrier. As currently defined in the OpenCL Specification, global synchronization is not allowed.

There are two types of synchronization between commands in a command-queue:

- command-queue barrier - enforces ordering within a single queue. Any resulting changes to memory are available to the following commands in the queue.
- events - enforces ordering between or within queues. Enqueued commands in OpenCL return an event identifying the command as well as the memory object updated by it. This ensures that following commands waiting on that event see the updated memory objects before they execute.

1.2 Hardware Overview

Figure 1.1 shows a simplified block diagram of a generalized GPU compute device.

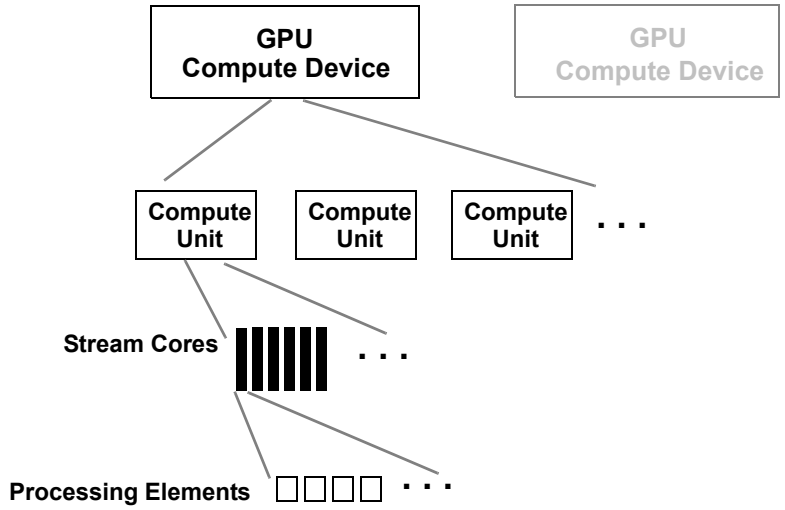

Figure 1.1 Generalized GPU Compute Device Structure

Figure 1.2 is a simplified diagram of an ATI Stream GPU compute device. Different GPU compute devices have different characteristics (such as the number of compute units), but follow a similar design pattern.

GPU compute devices comprise groups of compute units (see Figure 1.1). Each compute unit contains numerous stream cores, which are responsible for executing kernels, each operating on an independent data stream. Stream cores,