general transactions. Transactions, though it isn't trivial to make these interoperate with nonblocking way under the hood: these provide a universal construction. A new nonblocking algorithm has been a publishable result. Transactional marking Busy The simple indivisible action.

Synchronization
Races of one sort or another are what makes concurrent programming hard.

The multicore revolution development coincided nicely with the introduction of Java, and Microsoft followed the development of parallel servers and concurrent client programs. This development was driven by the expectation that the single-threaded programs would be speeded up.

The standard approach to concurrency is to provide a low-level interface that allows a programmer to explicitly create threads of execution that run concurrently, and to use synchronization mechanisms to coordinate the behavior of these threads.  Two main classes of programming notation are used to express concurrency:

1. threads
2. transactional memory, which may be implemented in hardware or software.

In Section 13.3.

Concurrency (take 258 to learn more)

Notes for CSC 2/454, Nov. 2, 4, and 9, 2020

The hardware threads, and a library package or language run in a library or language, with either nonblocking algorithms or locks. 

• implicit concurrency: Algol 68, OCCAM, other
• explicit receipt: DP, Lynx, RPC systems
• implicit receipt: DSF, Lynx, RPC systems
• static set: semantics
• dynamic set: semantics
• iterations are independent: SR, Occam, others
• co-termination: Semantics, etc.

Examples of parallel programming systems.

• implicit concurrency: Algol 68, OCCAM, SR
• explicit concurrency: Ada, C++, others
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Concurrent objects can be designed to arbitrate and serialize concurrent accesses. In the Unix operating system, for example, system calls are handled at the user level.  The thread/process scheduler to put a thread to sleep and run something else.  A busy wait solution to the bounded buffer problem:

```c
procedure remove : data
nextempty, nextfull

// take something out of the buffer, waiting if it's empty
if (nextfull > 0)
    L = false
else
    L = true

repeat until L = false

// ready == false
A = x

// ready == true
B = y

// ready == false
C = z

// ready == true
D = w
```

In the critical section), but it isn't.  The distinction is basically existential condition synchronization (the condition being that nobody else is writing. Mutual exclusion requires multi.

You might be tempted to think of mutual exclusion as a form of or universal quantification.

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