

## PSP. HILOS. EJERCICIO 2. BROKER

### Objetivo

Modelar e implementar un sistema de venta de acciones en la que una clase que tiene un número limitado de acciones para vender permite a los clientes comprar acciones en paquetes de un número entero.

### Pasos a seguir

- Diseña una clase `Broker` que reciba por su constructor el máximo número de acciones que se ponen a la venta.
  - Esta clase tiene un método `buy` que permite comprar un paquete de varias acciones y que devuelve un booleano `true` si se pudieron comprar las acciones y `false` si no se pudieron comprar. Este método debe estar sincronizado, pero no tiene que hacer esperar a los hilos clientes, tan solo mantener el número de acciones disponibles actualizado. Sí que tiene que avisar al hilo principal.
  - Además, tendrá un método `waitUntilNoSharesAvailable`, sincronizado, en el que el hilo que lo llame se tiene que quedar esperando mientras el número de acciones disponibles sea mayor que 0. Solo el hilo principal debe llamar a este método.
- Diseñar una clase `Client`, que hereda de `Thread` y que, en un bucle infinito, debe realizar una espera aleatoria de entre 1 y 2 segundos, e intentar comprar un número aleatorio de entre 1 y 5 acciones. Esta clase debe llevar la cuenta de las acciones que ha ido comprando hasta que le interrumpan, momento en el que imprimirá por pantalla dicho número.
- Por último, el hilo principal se encargará de crear el `Broker`, de crear al menos cuatro clientes e iniciarlos y de quedarse esperando a que al `Broker` no le queden acciones disponibles para vender, momento en el que interrumpirá a los clientes y esperará a que estos terminen.

Una posible traza de salida por consola sería la siguiente, ten en cuenta que la traza depende de en qué puntos pongas las llamadas para imprimir. Como podrás observar, la venta de acciones transcurre muy rápidamente cuando hay

muchas disponibles, pero cuando quedan pocas disponibles, en especial en aquellas ejecuciones en las que quede solo una, se tarda un rato hasta que algún cliente pida al azar un número bajo de acciones.

Sin ser una pregunta para este ejercicio, reflexiona sobre alguna manera en la que pudieras modificar el programa para que los clientes reaccionen a la escasez de oferta de acciones de forma que aumenten sus probabilidades de comprar.

```
Client María about to buy 1 shares
Broker: there's 20 available shares
Broker: now there's 19 available shares
Client María bought 1 shares
Client Vanesa about to buy 5 shares
Broker: there's 19 available shares
Broker: now there's 14 available shares
Client Vanesa bought 5 shares
Client Luis about to buy 6 shares
Broker: there's 14 available shares
Broker: now there's 8 available shares
Client Luis bought 6 shares
Client Alberto about to buy 2 shares
Broker: there's 8 available shares
Broker: now there's 6 available shares
Client Alberto bought 2 shares
Client Alberto about to buy 3 shares
Broker: there's 6 available shares
Broker: now there's 3 available shares
Client Alberto bought 3 shares
Client Vanesa about to buy 4 shares
Broker: there's 3 available shares
Client Vanesa couldn't buy 4 shares
Client María about to buy 2 shares
Broker: there's 3 available shares
Broker: now there's 1 available shares
Client María bought 2 shares
Client Luis about to buy 5 shares
Broker: there's 1 available shares
Client Luis couldn't buy 5 shares
Client Alberto about to buy 2 shares
Broker: there's 1 available shares
```

Client Alberto couldn't buy 2 shares  
Client Vanesa about to buy 6 shares  
Broker: there's 1 available shares  
Client Vanesa couldn't buy 6 shares  
Client Luis about to buy 5 shares  
Broker: there's 1 available shares  
Client Luis couldn't buy 5 shares  
Client María about to buy 6 shares  
Broker: there's 1 available shares  
Client María couldn't buy 6 shares  
Client Alberto about to buy 2 shares  
Broker: there's 1 available shares  
Client Alberto couldn't buy 2 shares  
Client Vanesa about to buy 3 shares  
Broker: there's 1 available shares  
Client Vanesa couldn't buy 3 shares  
Client María about to buy 2 shares  
Broker: there's 1 available shares  
Client María couldn't buy 2 shares  
Client Luis about to buy 4 shares  
Broker: there's 1 available shares  
Client Luis couldn't buy 4 shares  
Client Vanesa about to buy 5 shares  
Broker: there's 1 available shares  
Client Vanesa couldn't buy 5 shares  
Client Alberto about to buy 2 shares  
Broker: there's 1 available shares  
Client Alberto couldn't buy 2 shares  
Client Luis about to buy 6 shares  
Broker: there's 1 available shares  
Client Luis couldn't buy 6 shares  
Client María about to buy 4 shares  
Broker: there's 1 available shares  
Client María couldn't buy 4 shares  
Client Vanesa about to buy 4 shares  
Broker: there's 1 available shares  
Client Vanesa couldn't buy 4 shares  
Client Luis about to buy 3 shares  
Broker: there's 1 available shares  
Client Luis couldn't buy 3 shares

Client María about to buy 4 shares  
Broker: there's 1 available shares  
Client María couldn't buy 4 shares  
Client Alberto about to buy 6 shares  
Broker: there's 1 available shares  
Client Alberto couldn't buy 6 shares  
Client Luis about to buy 2 shares  
Broker: there's 1 available shares  
Client Luis couldn't buy 2 shares  
Client Alberto about to buy 4 shares  
Broker: there's 1 available shares  
Client Alberto couldn't buy 4 shares  
Client María about to buy 3 shares  
Broker: there's 1 available shares  
Client María couldn't buy 3 shares  
Client Vanesa about to buy 2 shares  
Broker: there's 1 available shares  
Client Vanesa couldn't buy 2 shares  
Client Alberto about to buy 6 shares  
Broker: there's 1 available shares  
Client Alberto couldn't buy 6 shares  
Client Vanesa about to buy 6 shares  
Broker: there's 1 available shares  
Client Vanesa couldn't buy 6 shares  
Client Luis about to buy 3 shares  
Broker: there's 1 available shares  
Client Luis couldn't buy 3 shares  
Client María about to buy 1 shares  
Broker: there's 1 available shares  
Broker: now there's 0 available shares  
Client María bought 1 shares  
Client Alberto bought 5 shares in total  
Client Luis bought 6 shares in total  
Client Vanesa bought 5 shares in total  
Client María bought 4 shares in total

Process finished with exit code 0