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Homework 2

Question 1

Rename.java (portion)

```
public Result rename() {

    boolean search = true;
    int down = 0, right = 0, id = -1;

    while (search) {

        Splitter splitter = null;

        try {
            splitter = m_splitters[down][right];
        } catch (Exception e) {
            return null;
        }
        if (splitter == null) {
            return null;
        }

        Direction direction = splitter.getDirection(Thread.currentThread()
                .getId());

        switch (direction) {
        case DOWN: {
            down++;
            break;
        }
        case RIGHT: {
            right++;
            break;
        }
        case STOP: {
            id = getId(down, right, m_range); // Use the function below to
calculate id from the returned Result
            search = false;

            break;
        }
        }
    }

    return new Result(down, right, id);
}

public static int getId(int down, int right, int range) {

    int y = down * (down + 1) / 2 + 1;
    int x = 0;

    // Arithmetic series
    if (right > 0) {
        int dx = down + 1;
        int ex = dx + right;
        int sx = dx * (dx + 1) / 2;
        x = ex * (ex + 1) / 2 - sx;
    }

    // Based on grid position not the previous id
    return x + y;
}
```

Splitter.java (portion)

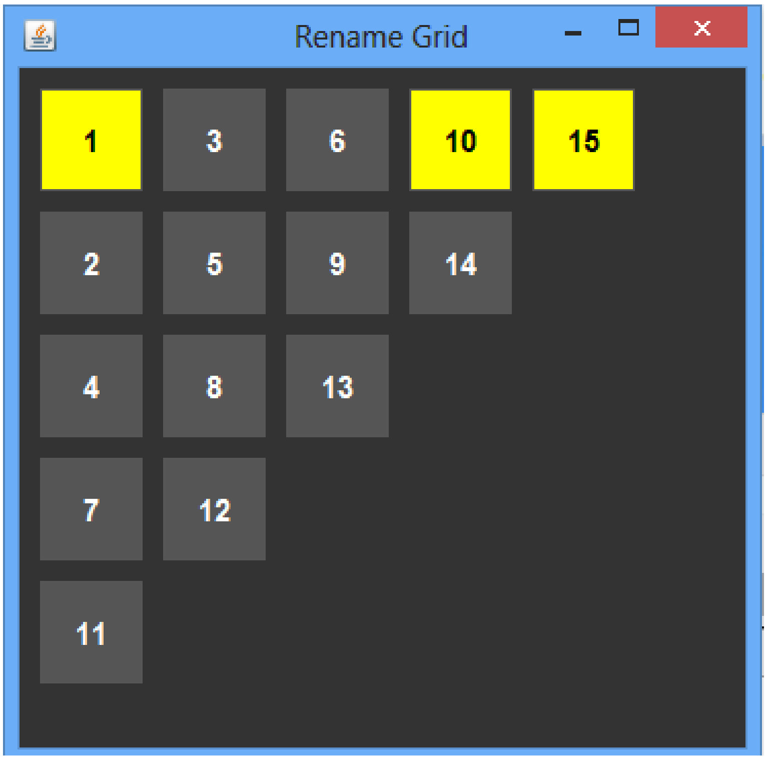
```
public Direction getDirection(long pid) {

    m_pid.set(pid);

    if (m_stopped.get()) {
        return Direction.RIGHT;
    } else {
        m_stopped.set(true);
        if (m_pid.get() == pid) {
            return Direction.STOP;
        } else {
            return Direction.DOWN;
        }
    }
}

public void release() {
    m_stopped.set(false);
}
```

Visual



1	3	6	10	15
2	5	9	14	
4	8	13		
7	12			
11				

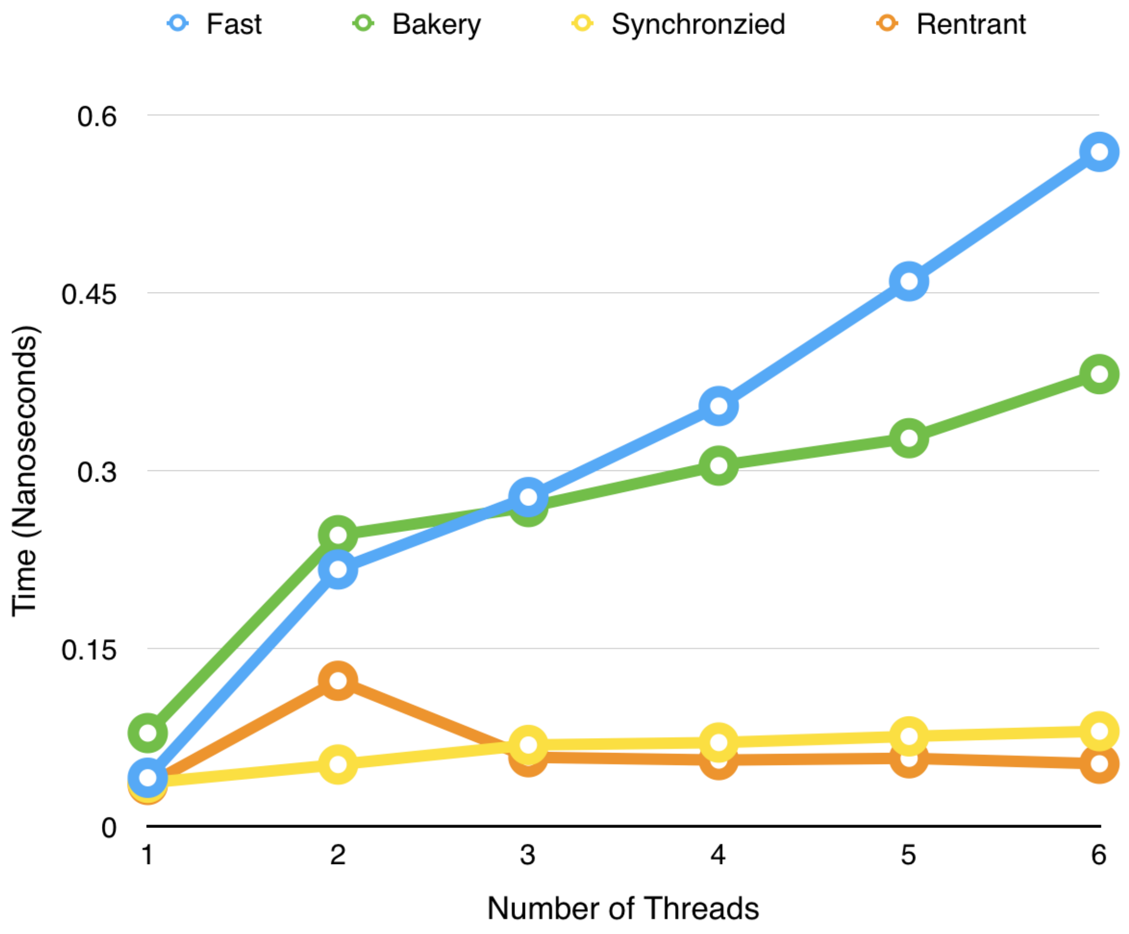
Question 2

If a read occurs concurrently with a write and an unexpected value can be read via a different thread, the Bakery algorithm would fail. Consider the case of two threads A and B. An example of this is as follows:

Thread A	Thread B	
Enter CS	Waiting in while-loop	label[A] = 1; label[B] = 2;
Exits CS	OS halts	label[A] = 0; label[B] = 2;
Lock called	…	label[A] = 1; label[B] = 2;
Write label[A] = 3	Reads wrong label. Enters CS.	label[A] = 55; (Thread B reads Thread A wrong)
Enters CS	In CS	label[A] = 3; label[B] = 2;

Question 3

Graph


Fast
Bakery
Synchronzied
Rentrant
Time (Nanoseconds)
Number of Threads