



# Kotlin Coroutines

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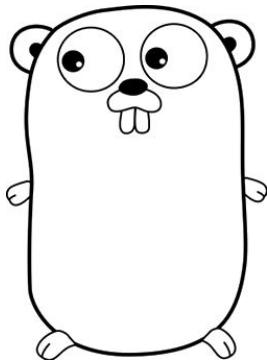


# Asynchronous programming

async/await



# Asynchronous programming



# goroutines



# Callback Hell





# The problem

Time consuming operation  
Freezes application

```
val bitmap = processBitMap("image.png")  
mImageView.setImageBitmap(bitmap)
```



# Worker threads

```
new Thread(new Runnable() {  
    public void run() {  
        final Bitmap bitmap = processBitMap("image.png");  
        mImageView.post(new Runnable() {  
            public void run() {  
                mImageView.setImageBitmap(bitmap);  
            }  
        });  
    }  
}).start();
```

Background thread  
OK!



# Worker threads

```
new Thread(new Runnable() {  
    public void run() {  
        final Bitmap bitmap = processBitMap("image.png");  
        mImageView.post(new Runnable() {  
            public void run() {  
                mImageView.setImageBitmap(bitmap);  
            }  
        });  
    }  
}).start();
```

Threads are expensive

<https://developer.android.com/guide/components/processes-and-threads.html>



# Worker threads

```
new Thread(new Runnable() {  
    public void run() {  
        final Bitmap bitmap = processBitMap("image.png");  
        mImageView.post(new Runnable() {  
            public void run() {  
                mImageView.setImageBitmap(bitmap);  
            }  
        });  
    }  
}).start();
```

Object allocations

<https://developer.android.com/guide/components/processes-and-threads.html>



# Callback style

```
fun processBitMap(name: String,  
                  callback: (Throwable?, Bitmap?) -> Unit)
```



# Future

```
fun processBitMap(name: String): Future<Bitmap>
```



# Kotlin way

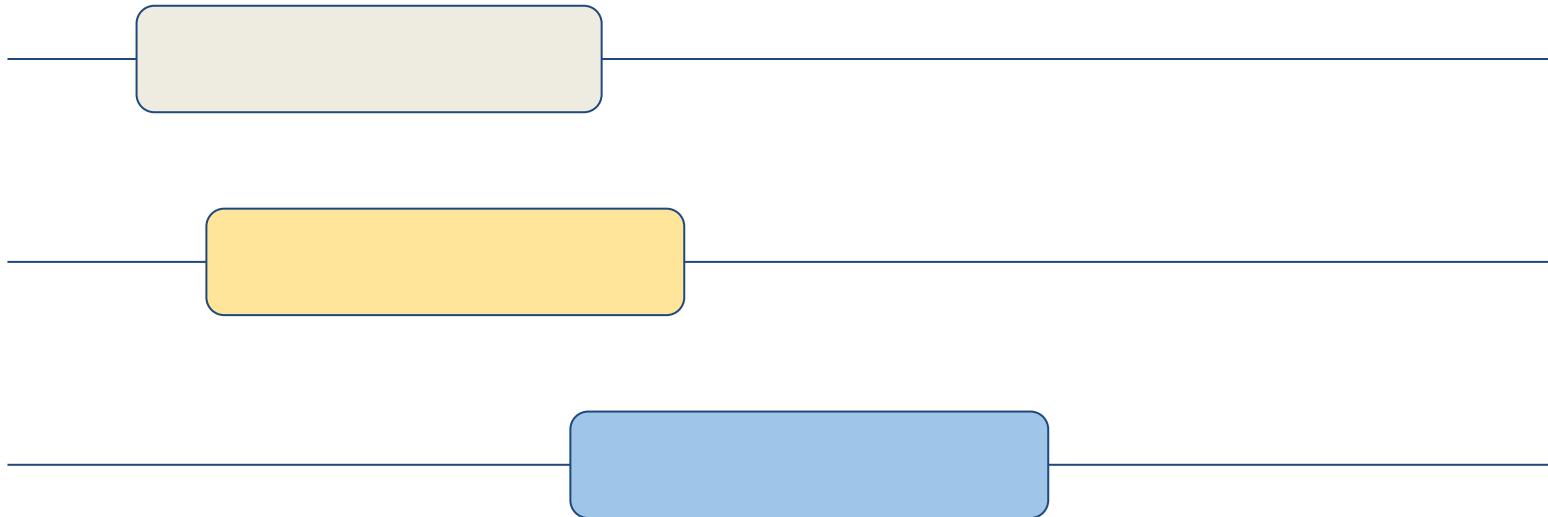
```
suspend fun processBitMap(name: String): Bitmap
```



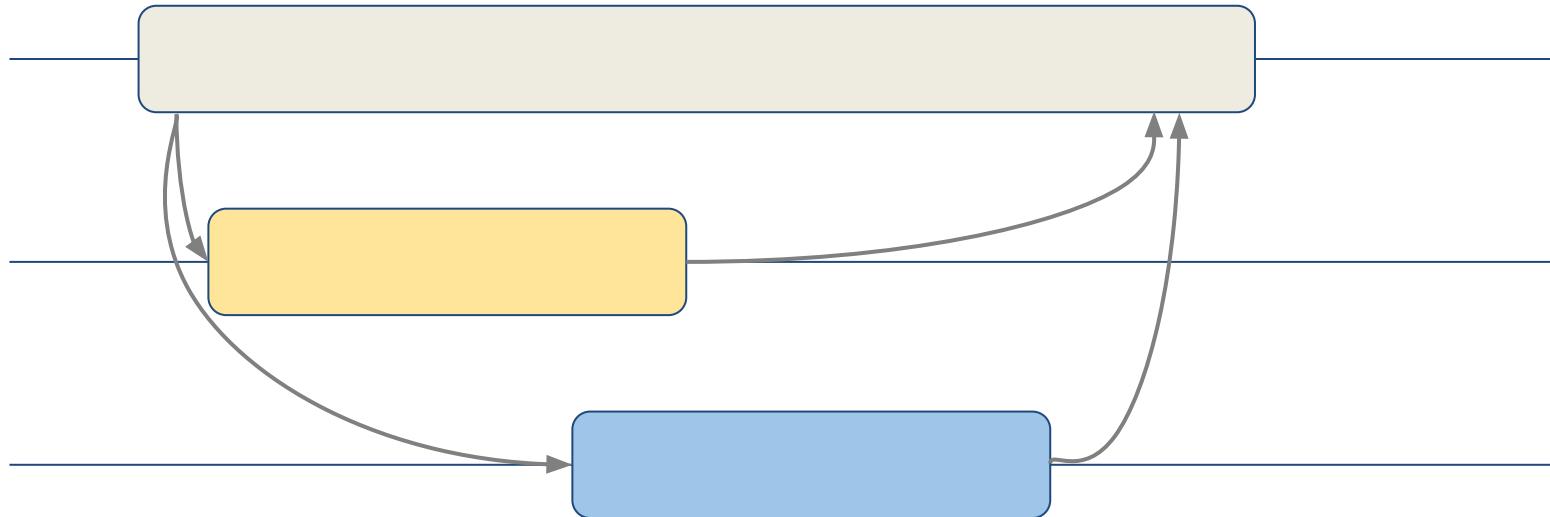
# Kotlin way

```
val bitmap = processBitMap("image.png")
mImageView.setImageBitmap(bitmap)
```

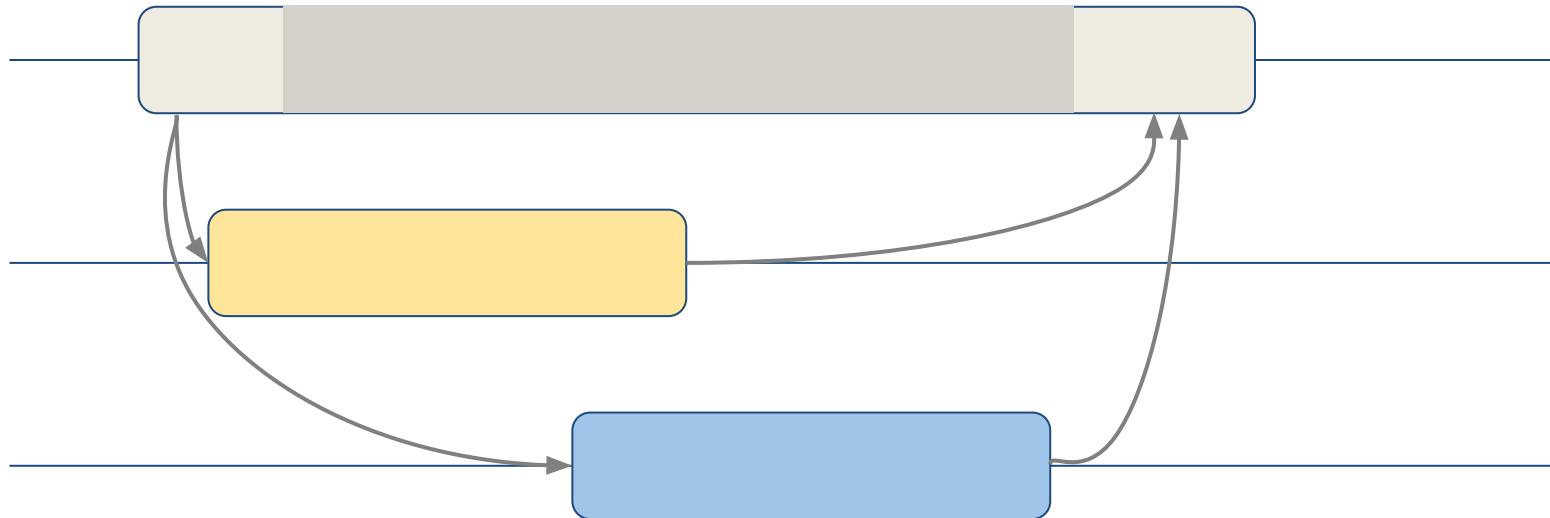
# Threads vs Coroutines



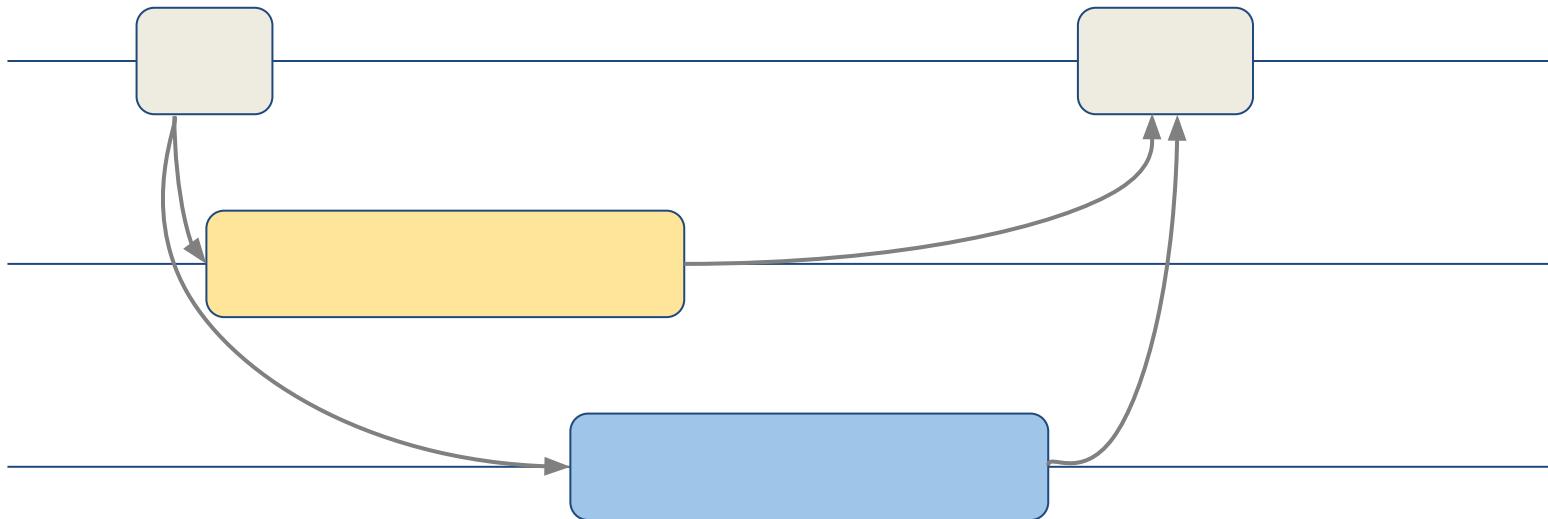
# Threads vs Coroutines



# Threads vs Coroutines

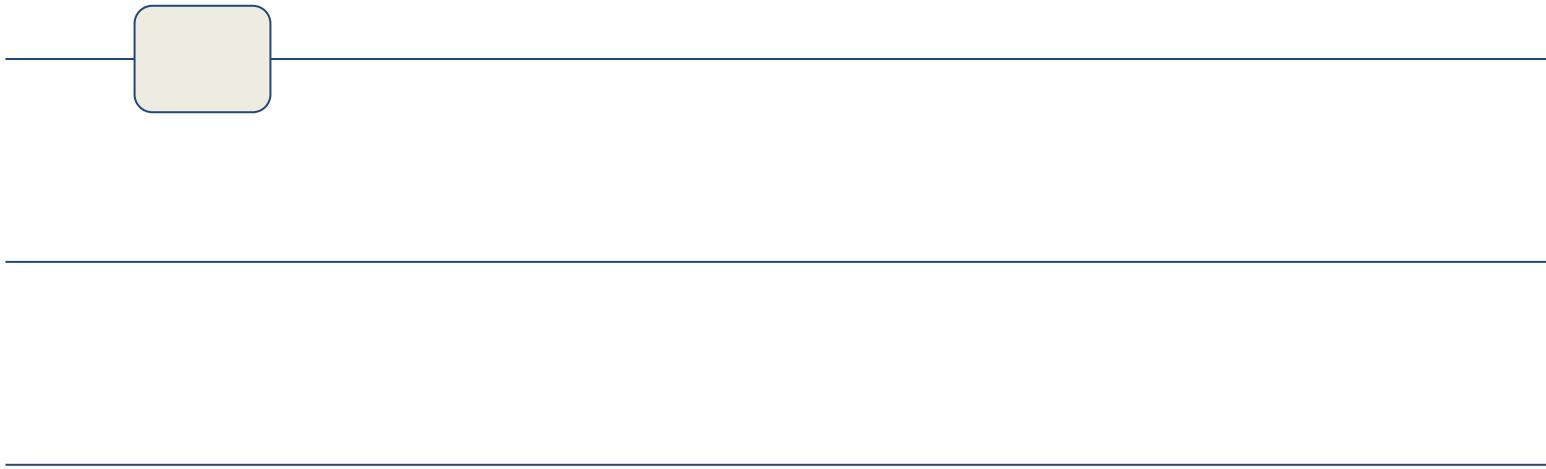


# Threads vs Coroutines

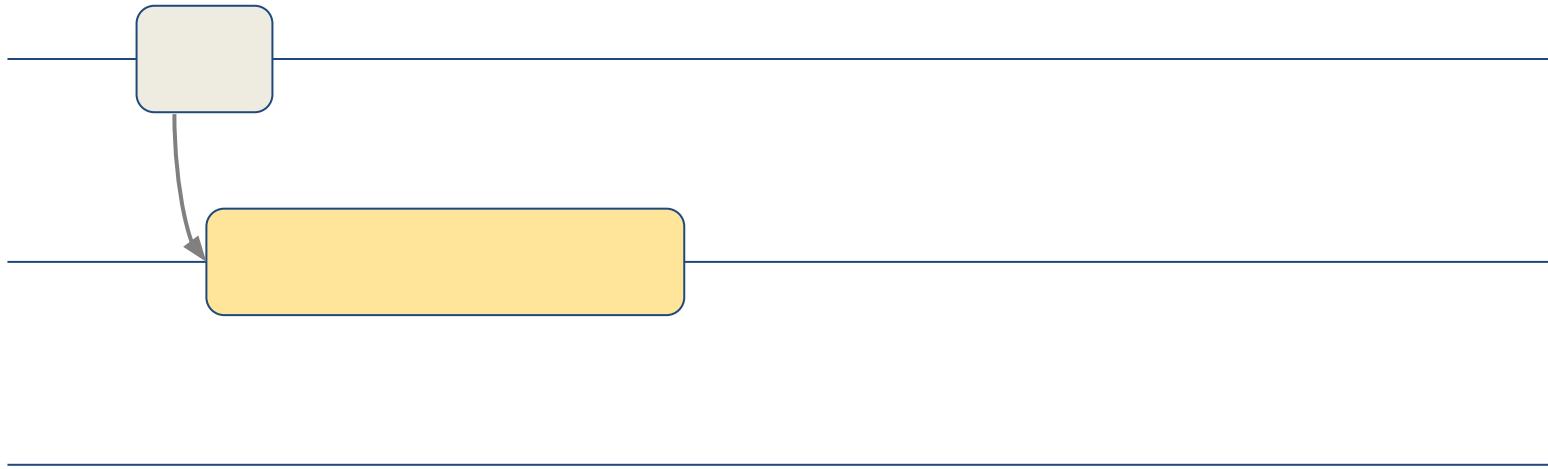




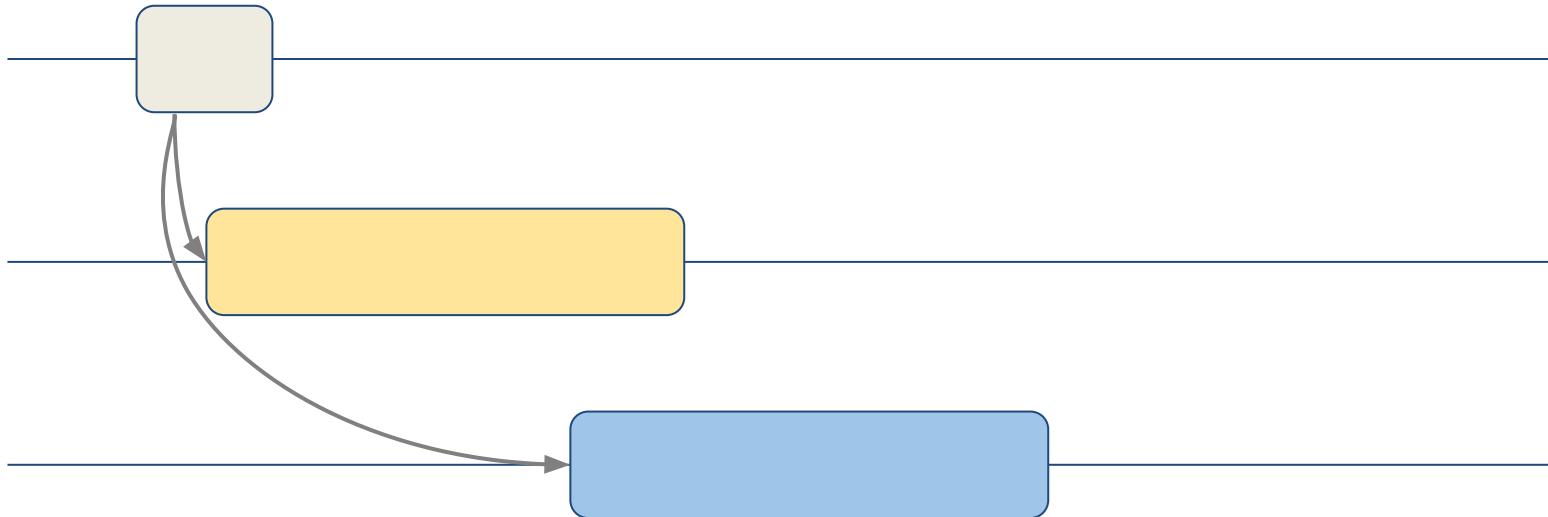
# Threads vs Coroutines



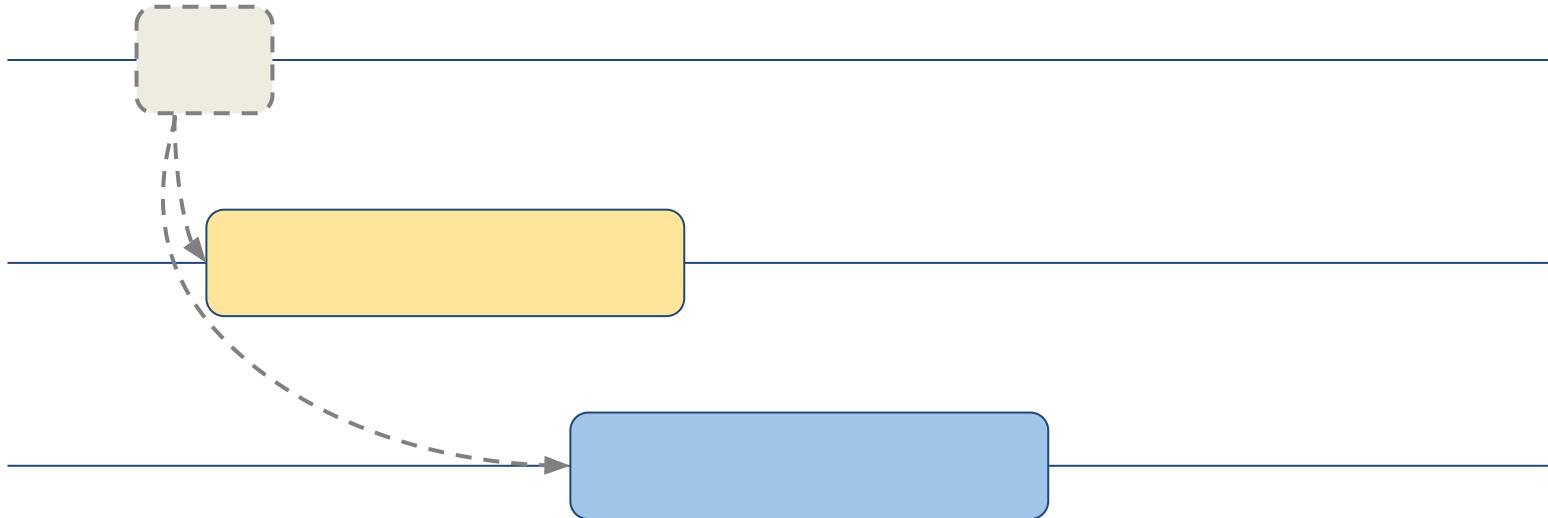
# Threads vs Coroutines



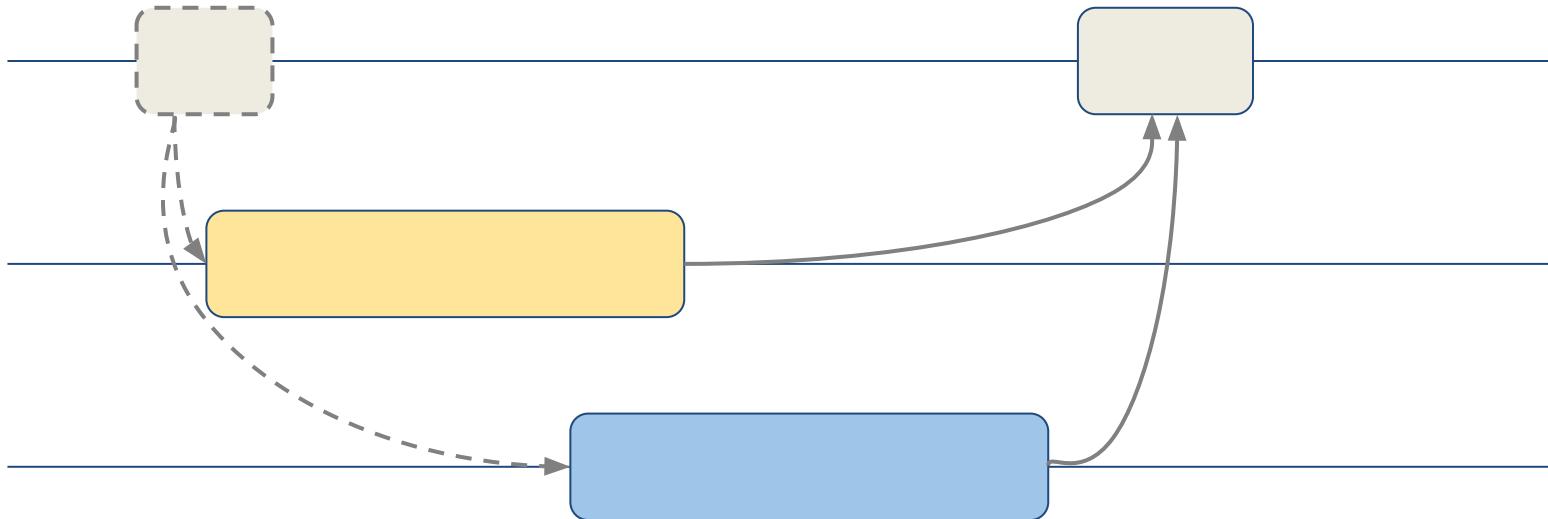
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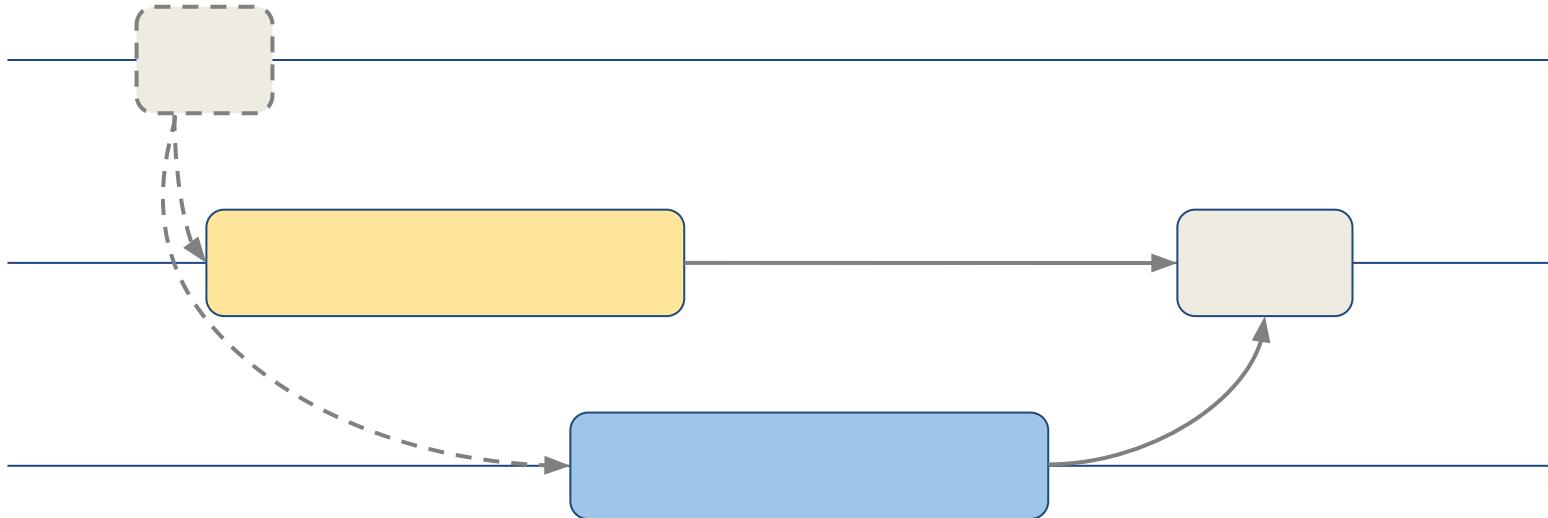
# Threads vs Coroutines



# Threads vs Coroutines



# Threads vs Coroutines





# suspend

```
fun applyImageFilter() {  
    val bitmap = processBitMap("image.png")  
    mImageView.setImageBitmap(bitmap)  
}
```

suspendable function must be called  
from another suspendable function



# suspend

```
suspend fun applyImageFilter() {  
    val bitmap = processBitMap("image.png")  
    mImageView.setImageBitmap(bitmap)  
}
```

suspendable function must be called  
from another suspendable function



# Coroutine builders

```
suspend fun applyImageFilter() {  
    val bitmap = processBitMap("image.png")  
    mImageView.setImageBitmap(bitmap)  
}
```

```
async {  
    applyImageFilter()  
}
```



# Coroutine builders

```
async(CommonPool) {  
    applyImageFilter()  
}
```



# Coroutine builders

```
async(CommonPool) {  
    applyImageFilter()  
}
```

```
async(UI) {  
    applyImageFilter()  
}
```



# Integration

```
suspend fun applyImageFilter() {  
    val bitmap = processBitMap("image.png").await()  
    mImageView.setImageBitmap(bitmap)  
}
```



# Loops

```
suspend fun applyImageFilter() {  
    for (i in 0..10) {  
        val bitmap = processBitMap("image$i.png").await()  
        mImageViews[i].setImageBitmap(bitmap)  
    }  
}
```



# Exception handling

```
suspend fun applyImageFilter() {  
    val bitmap = processBitMap("image.png").await()  
    mImageView.setImageBitmap(bitmap)  
}
```



# Exception handling

```
suspend fun applyImageFilter() {  
    try {  
        val bitmap = processBitMap("image.png").await()  
        mImageView.setImageBitmap(bitmap)  
    } catch(t: Throwable) {  
        ...  
    }  
}
```



# Demo

Live coding



# Links

kotlinx.coroutines

<https://github.com/Kotlin/kotlinx.coroutines>

Coroutines Design Document (KEEP)

<https://github.com/Kotlin/kotlin-coroutines/blob/master/kotlin-coroutines-information.md>

Coroutines by example

<https://github.com/Kotlin/kotlinx.coroutines/blob/master/coroutines-guide.md>

Kotlin Coroutine (Experimental) Adapter

<https://github.com/JakeWharton/retrofit2-kotlin-coroutines-adapter>



# Thank you!

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# Questions?

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