2019 RT-Thread 物联网操作系统

学习永无止境~

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关于我

一个梦想成为物联网全栈工程师的小菜鸟~

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01. 线程的状态

初始态（RT_THREAD_INIT）

就绪态（RT_THREAD_READY）

运行态（RT_THREAD_RUNNING）

挂起态（RT_THREAD_SUSPEND）、阻塞状态（RT_THREAD_BLOCK）

关闭态（RT_THREAD_CLOSE）

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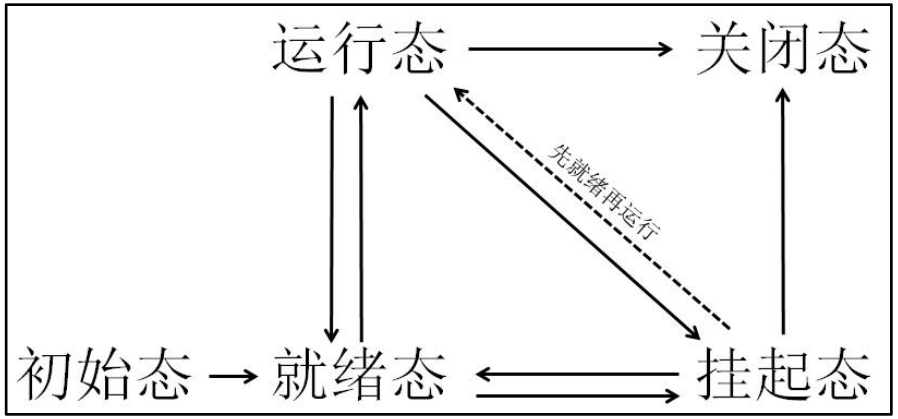
02. 线程状态迁移



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03. 线程挂起 rt_thread_suspend()

线程挂起可以由多种方法实现：线程调用rt_thread_delay()、rt_thread_suspend()等函数接口可以使得线程主动挂起，放弃CPU使用权，当线程调用rt_sem_take()，rt_mb_recv()等函数时，资源不可使用也会导致调用线程被动挂起。

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04. 线程恢复 rt_thread_resume()

让挂起的线程重新进入就绪状态，恢复的线程会保留挂起前的状态信息，在恢复的时候根据挂起时的状态继续运行。如果被恢复线程在所有就绪态线程中，位于最高优先级链表的第一位，那么系统将进行线程上下文的切换。

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05. 线程设计要点

中断上下文环境：不能使用挂起当前线程的操作，不允许调用任何会阻塞运行的API函数接口。

线程上下文环境：线程中不允许出现死循环（此处的死循环是指没有不带阻塞机制的线程循环体），将紧急的处理事件的线程优先级设置得高一些。

空闲线程：空闲钩子函数、回收删除的线程。
空闲钩子函数不允许出现阻塞线程的情况，也不允许出现死循环。

线程的执行时间：程序运行时间、周期。

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06. 写代码做实验

创建两个线程，按下按键就挂起线程

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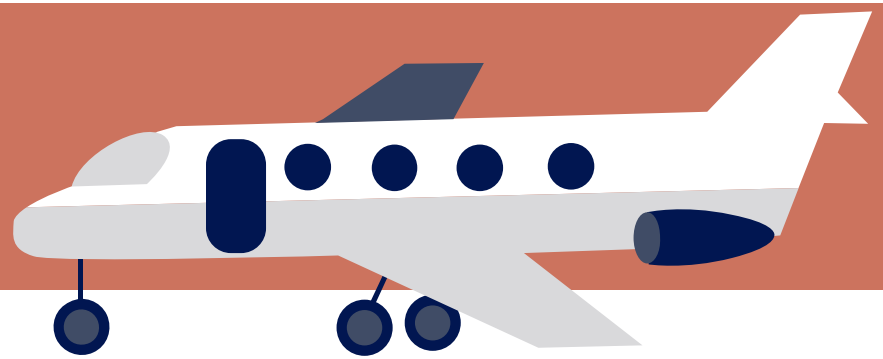
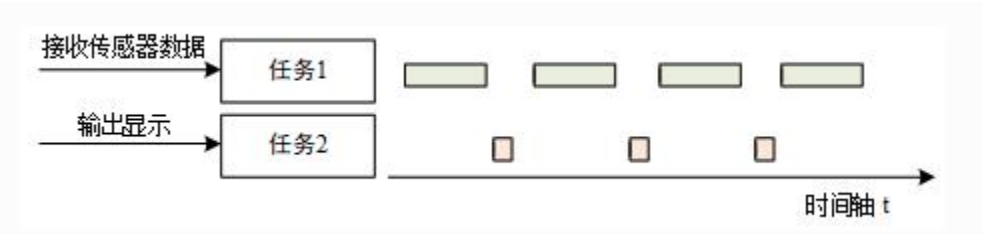
01

线程的概念



把一个复杂的应用分解成多个小的、可调度的、序列化的程序单元，当合理地划分线程并正确地执行。



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02. 线程的概念

线程是 RT-Thread 中最基本的调度单位，它描述了一个线程执行的运行环境，也描述了这个线程所处的优先级。

线程执行时的运行环境称为上下文。

无限循环模式：

```
void thread_entry(void* paramenter)
{
    while (1)
    {
        /* 等待事件的发生 */
        /* 对事件进行服务、进行处理 */
    }
}
```

顺序执行或有限次循环模式：

```
void thread_entry(void* paramenter)
{
    /* 处理事务 #1 */
    …
    /* 处理事务 #2 */
    …
    /* 处理事务 #3 */
}
```

此类线程不会循环或不会永久循环，而是 “一次性”线程，一定会被执行完毕。在执行完毕后，线程将被系统自动删除。

线程中必须出现阻塞情况，以让出CPU使用权。

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03. 线程控制块

通常我们认为线程控制块就是线程的身份证。

线程控制块就是一个结构体，里面有非常多的成员，这些成员共同描述了线程的全部信息

代码：https://github.com/jiejieTop/RT-Thread_Demo

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04. 线程栈

RT-Thread 线程具有独立的栈空间，当进行线程切换时，会将当前线程的上下文存在栈中，当线程要恢复运行时，再从栈中读取上下文信息，进行恢复。

线程栈的增长方向是芯片构架密切相关的（比如stm32就是向下增长的）。

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04. 线程栈

向下生长的满栈"模型。栈指针 SP 指向最后一个被压入栈的 32 位数值。在下一次压栈时， SP 先自减 4，再存入新的数值

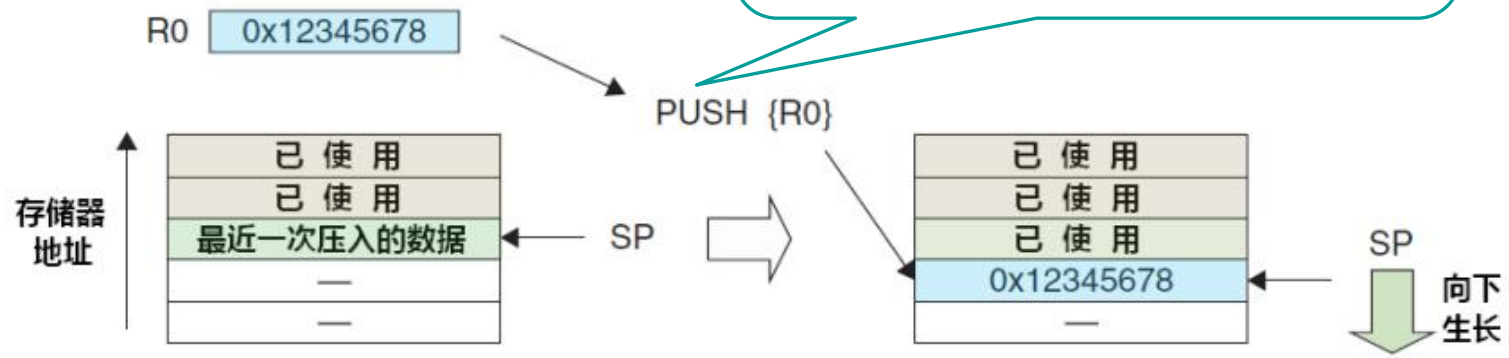

图 3.13 Cortex-M3 堆栈的 PUSH 实现方式

POP 操作刚好相反：先从 SP 指针处读出上一次被压入的值，再把 SP 指针自增 4。

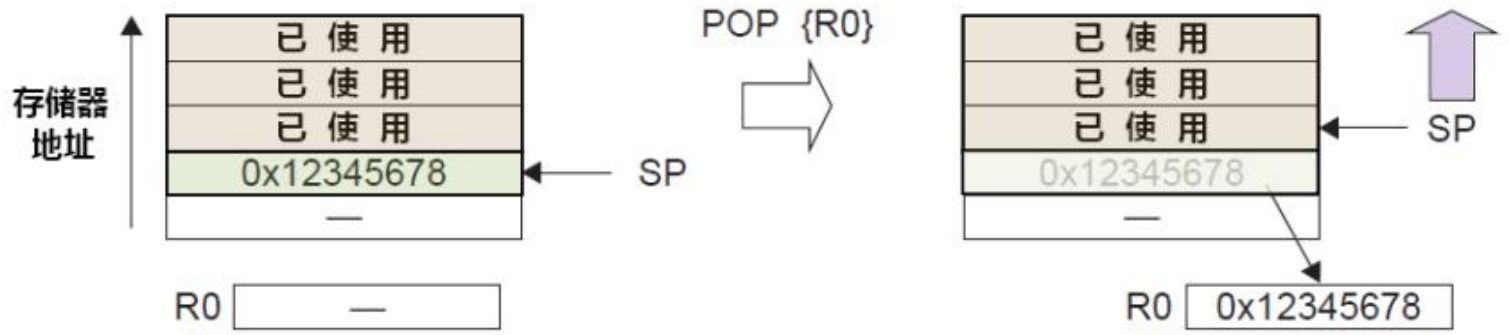

图 3.14 Cortex-M3 堆栈的 POP 实现方式

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05. 线程优先级

RT-Thread 线程的优先级是表示线程被调度的优先程度。每个线程都具有优先级，线程越重要，赋予的优先级就应越高， 线程被调度的可能才会越大。

RT-Thread 最大支持 256 个线程优先级 (0\~255)，数值越**小**的优先级越高，0 为最高优先级。最低优先级默认分配给空闲线程使用。

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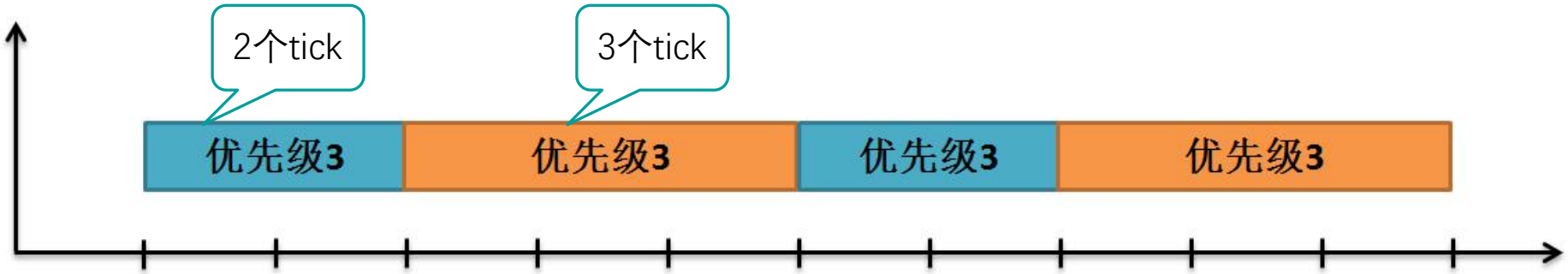

相同优先级下时间片才有效。

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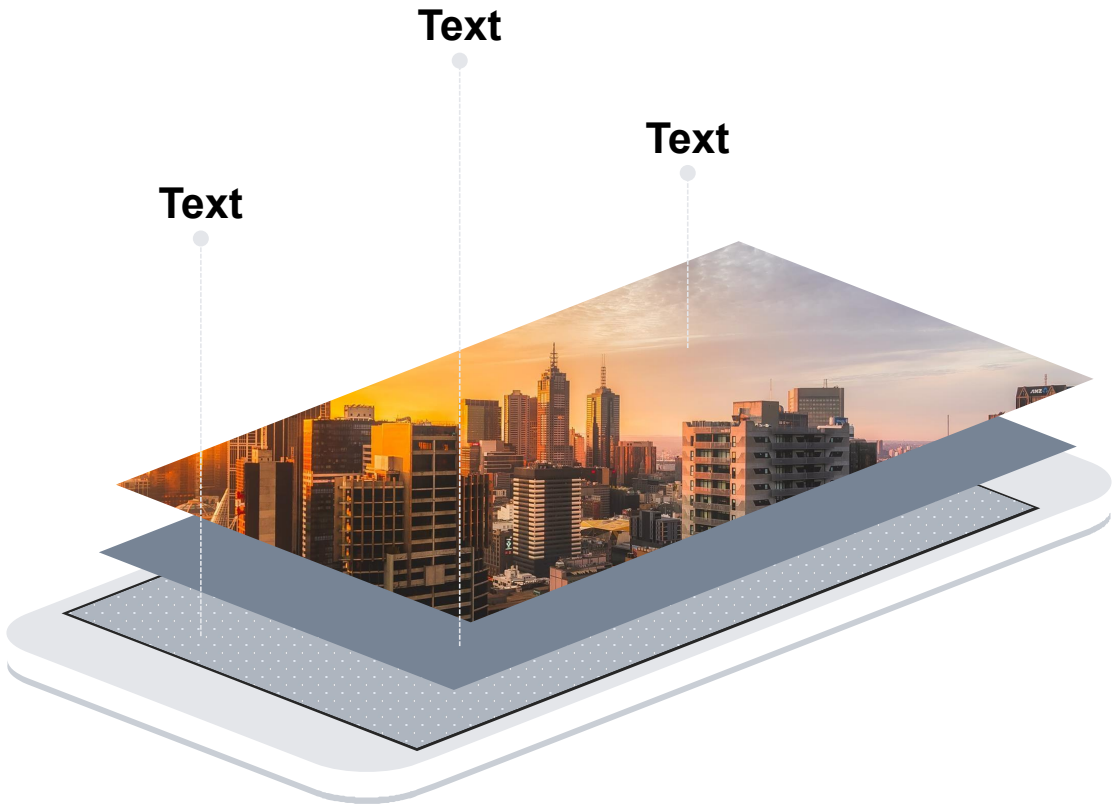

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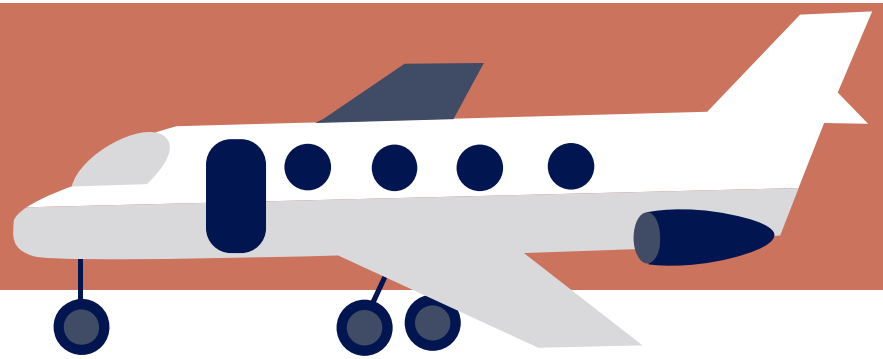

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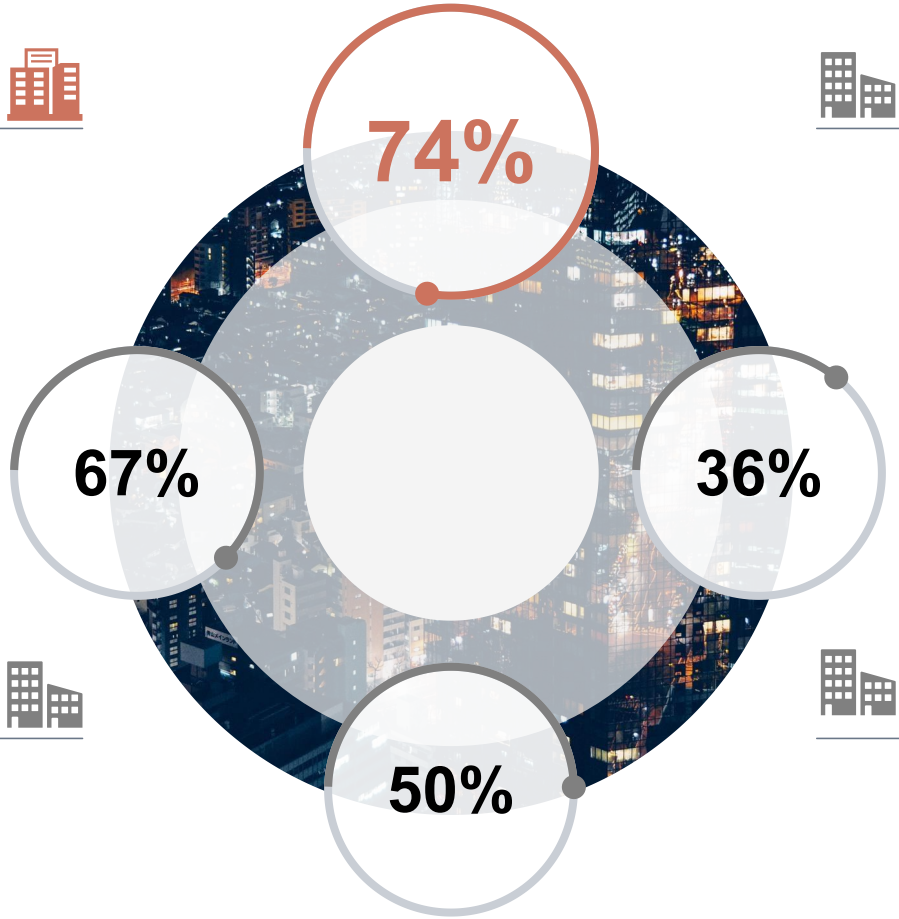

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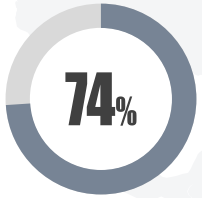

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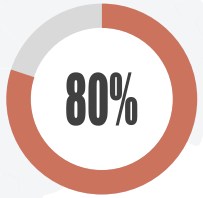

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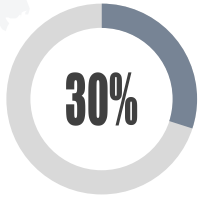

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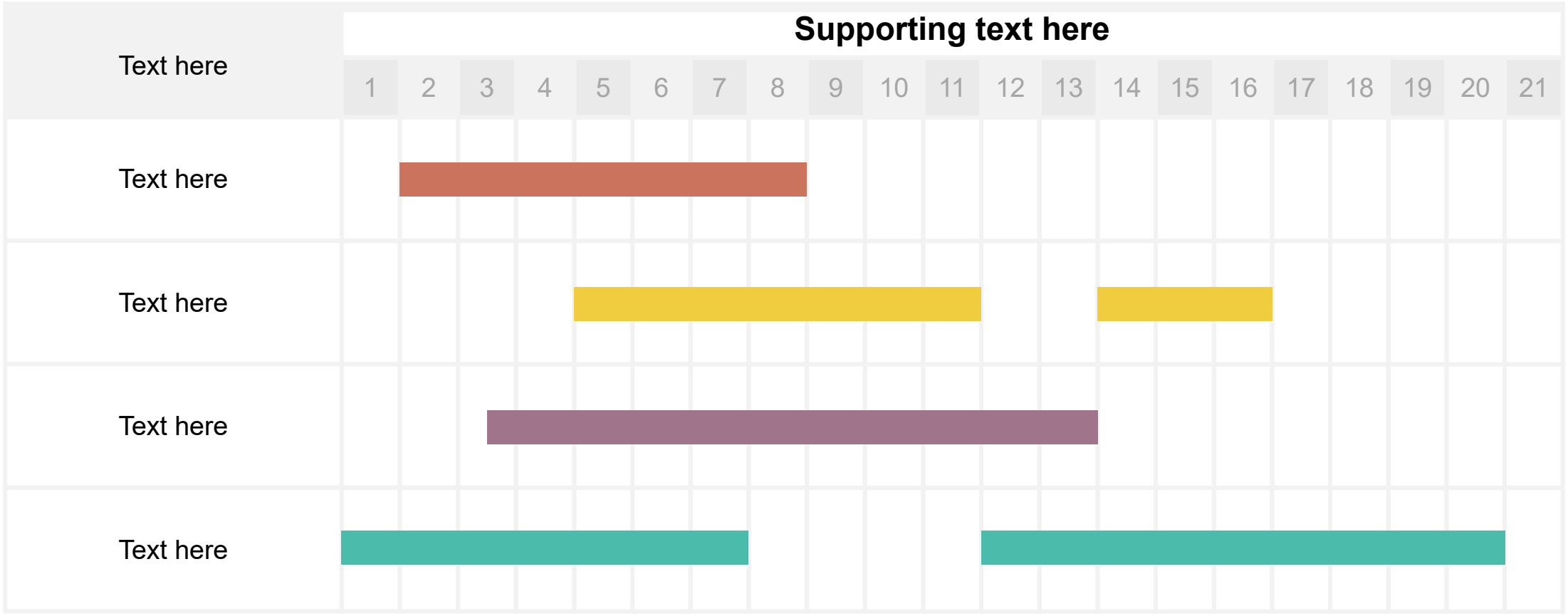

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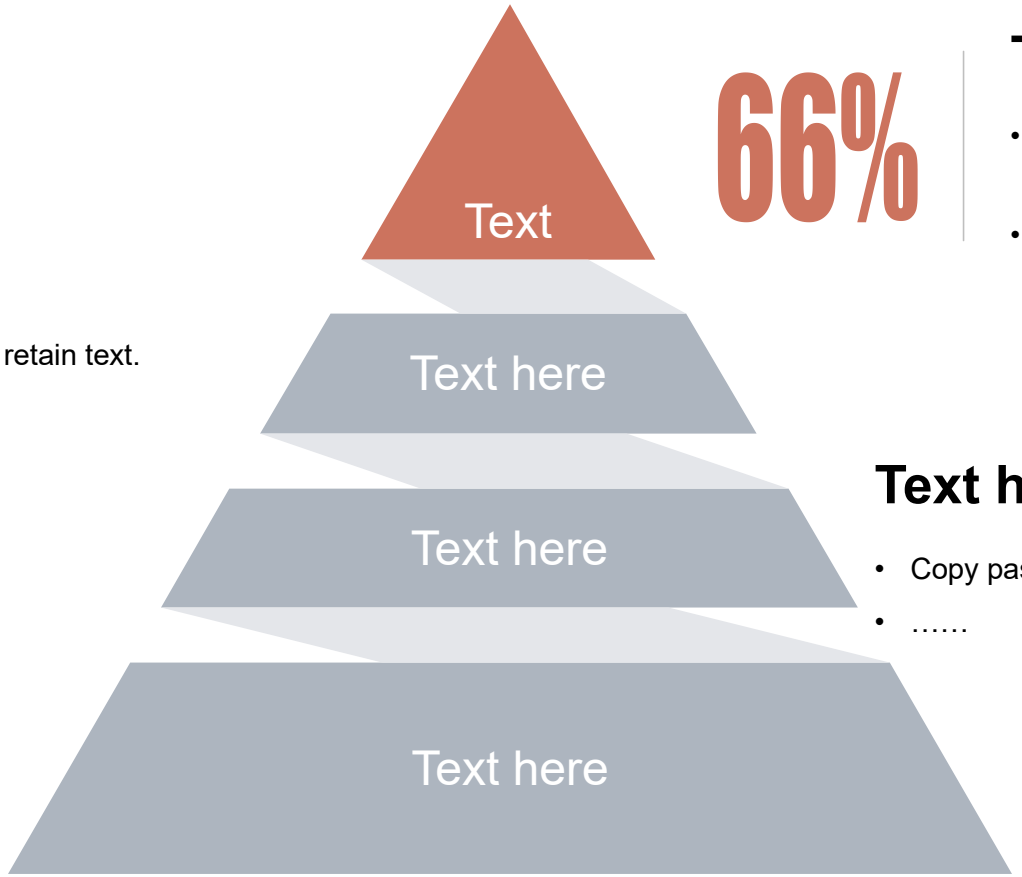

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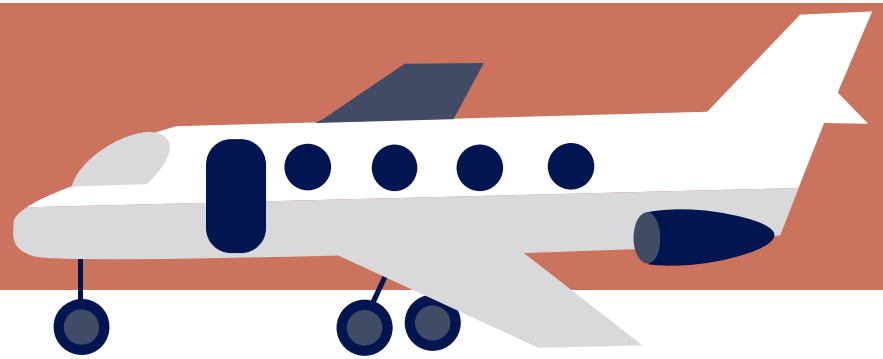

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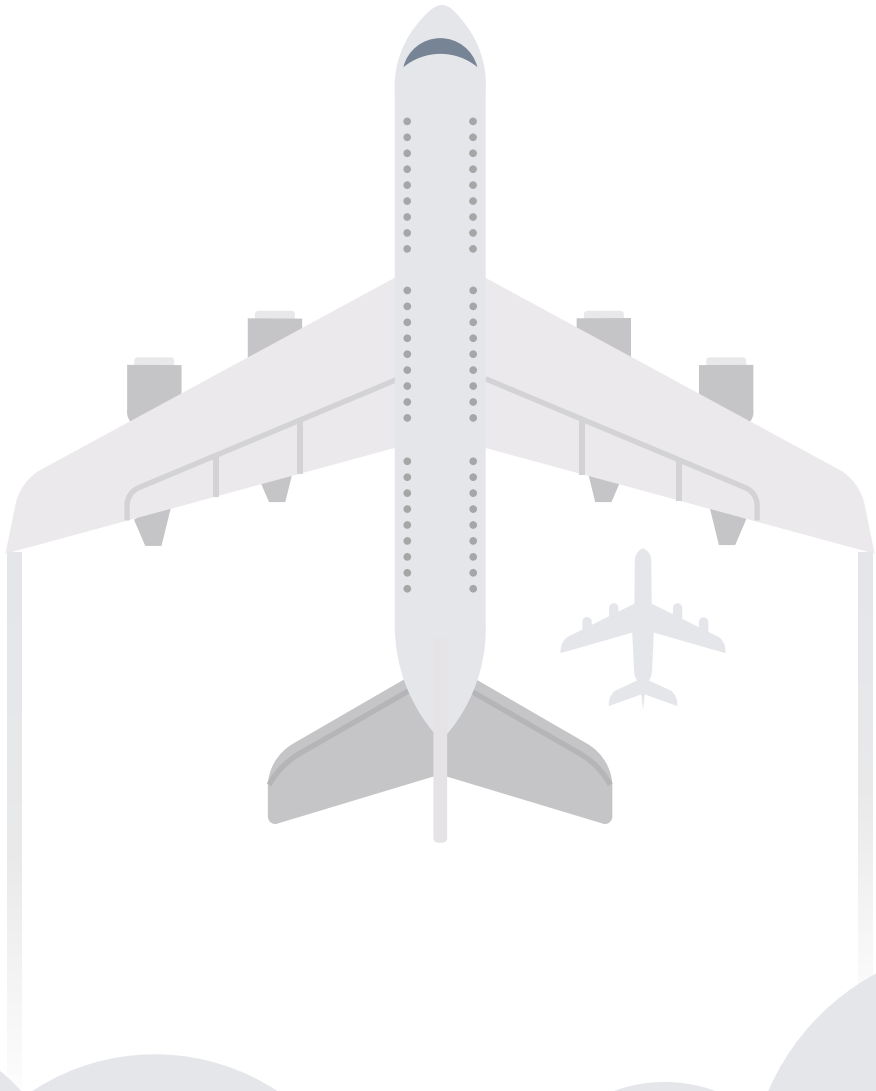

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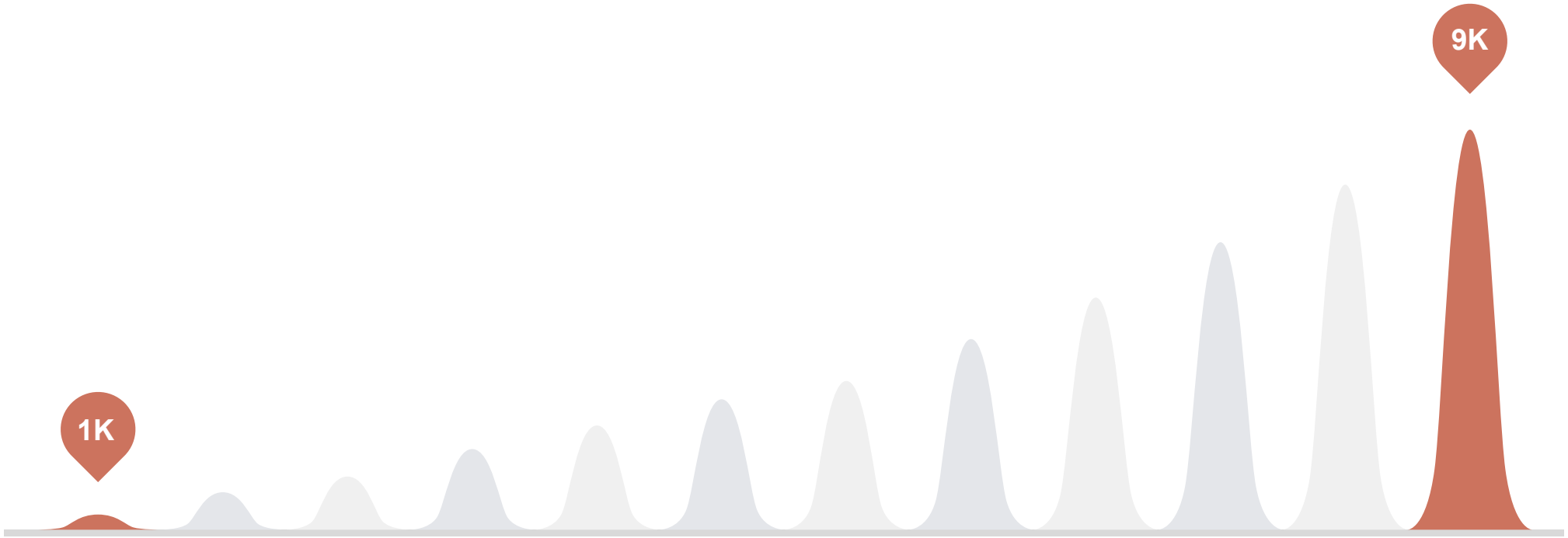

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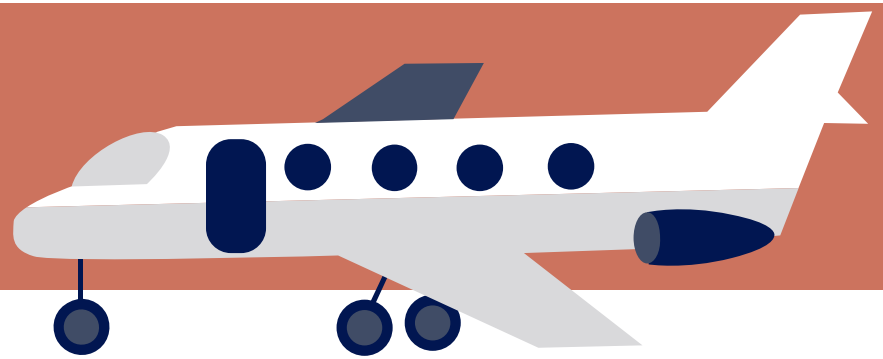

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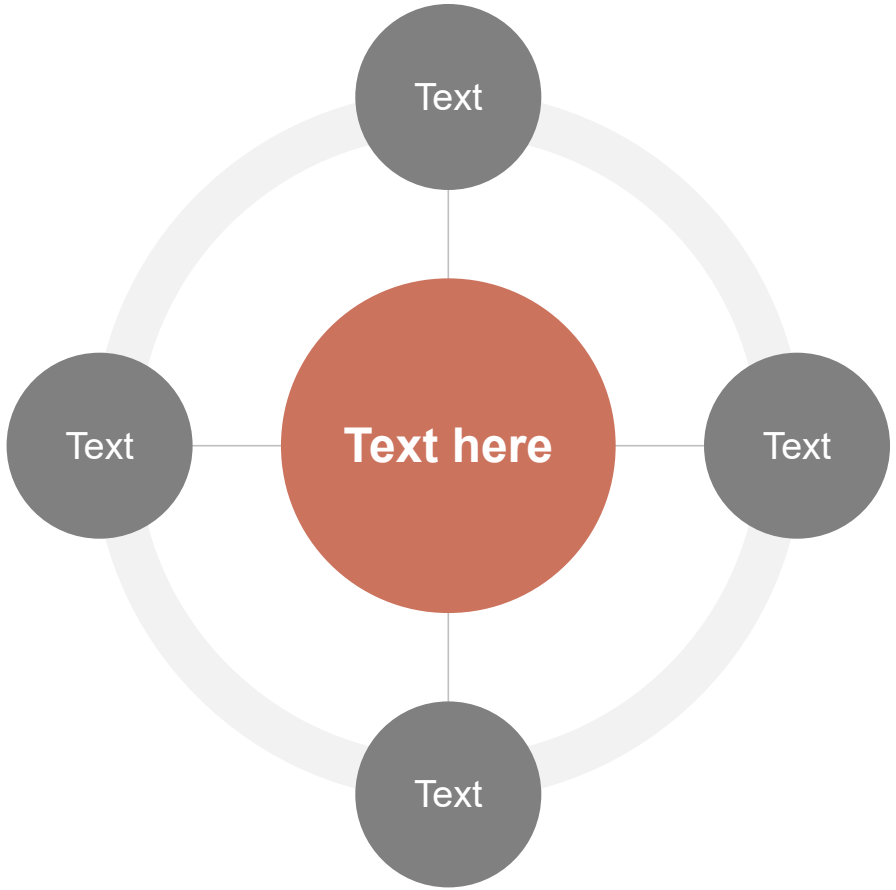

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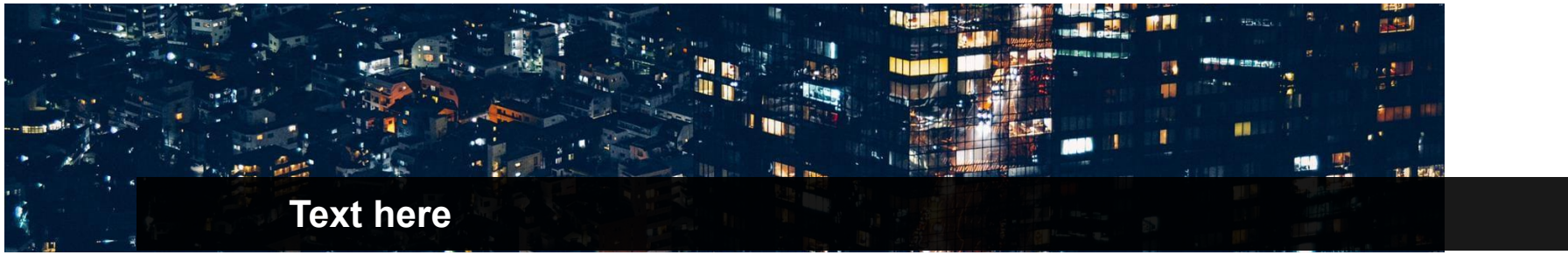

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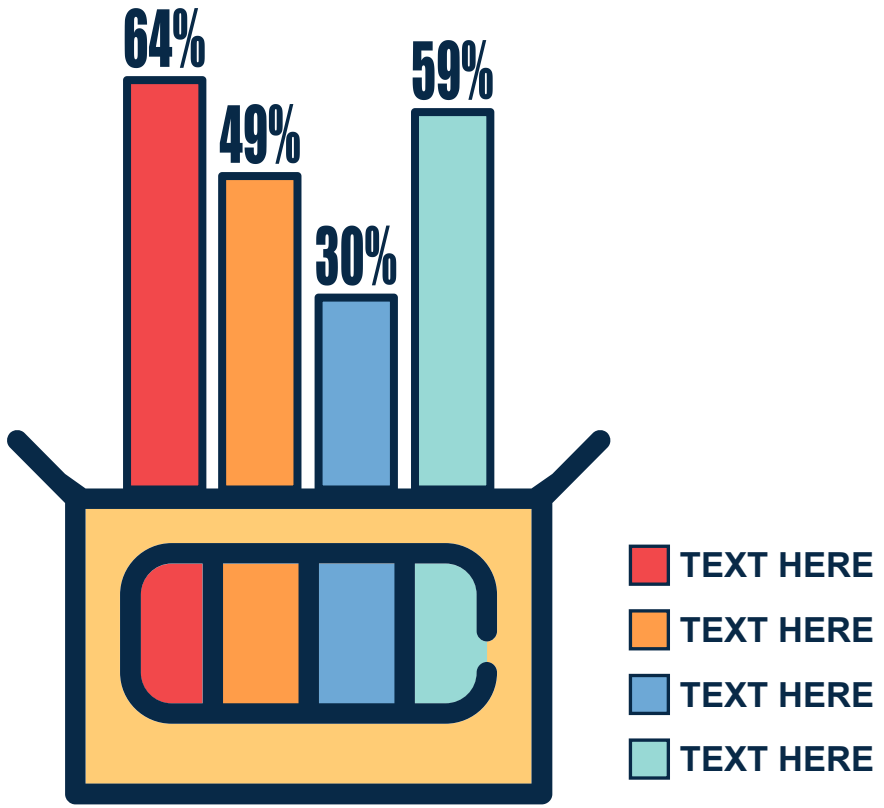

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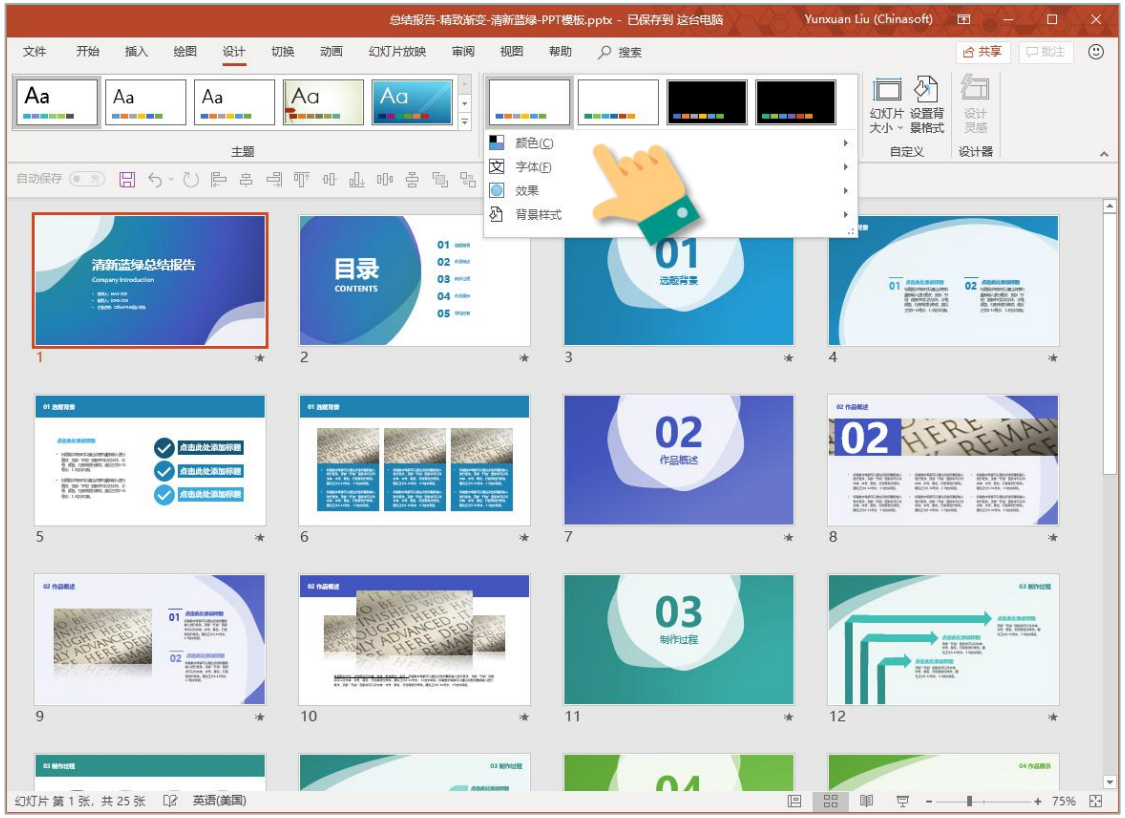

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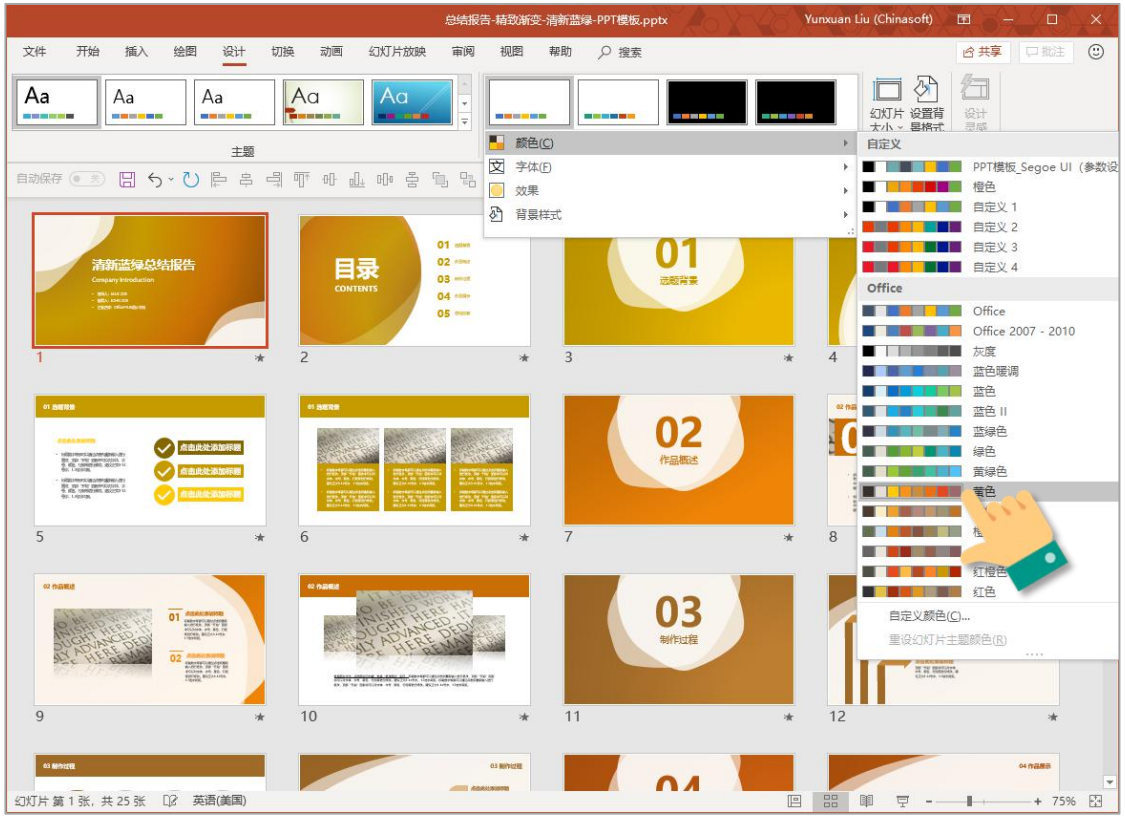

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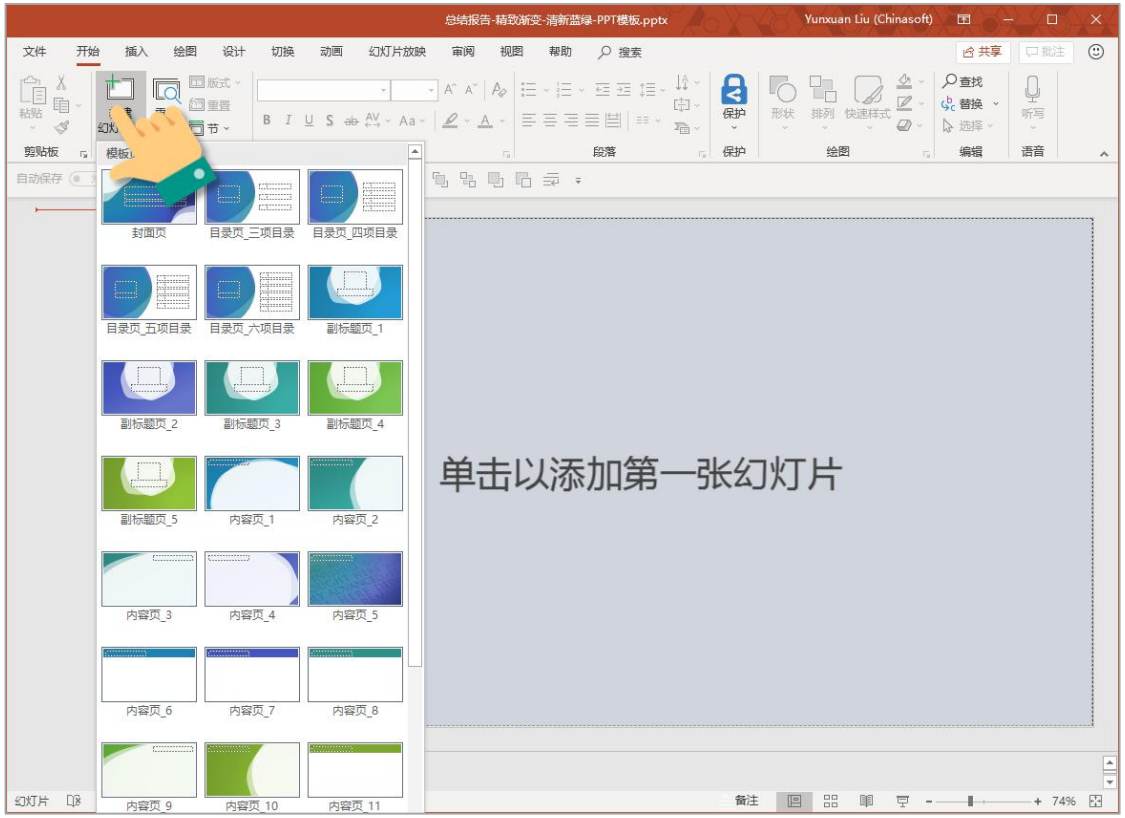

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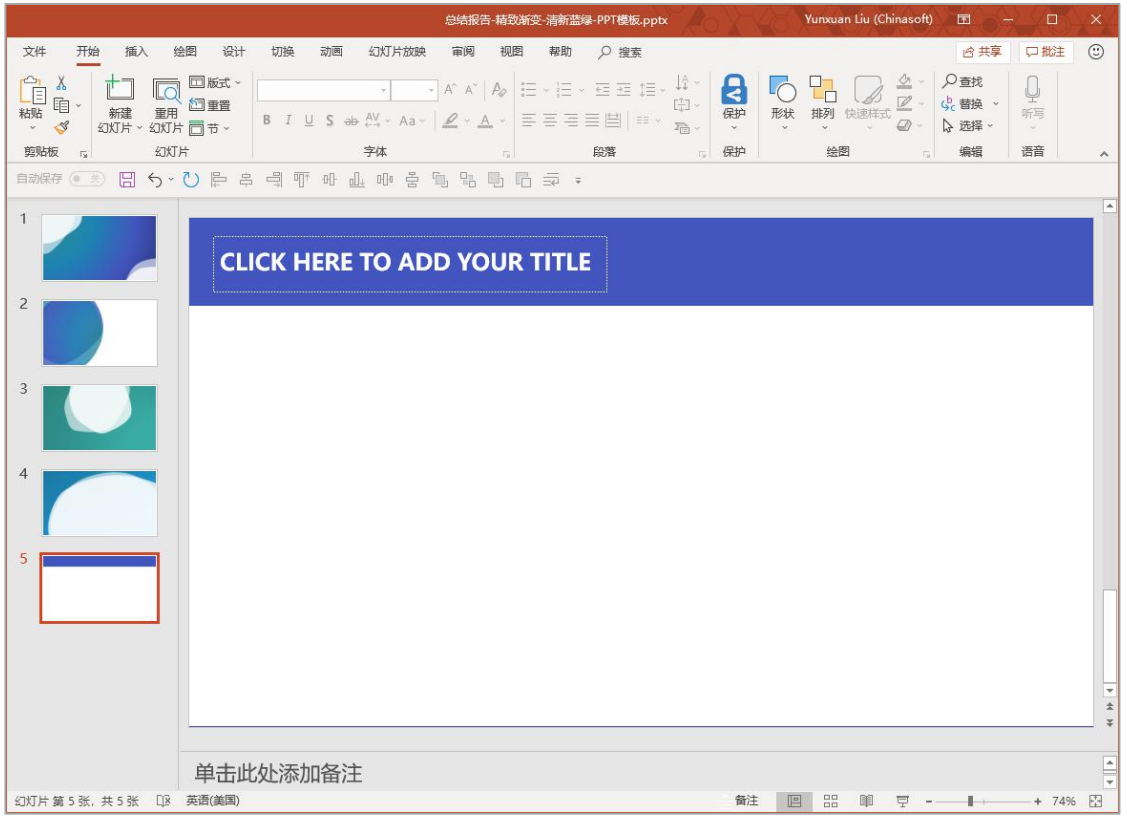

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