

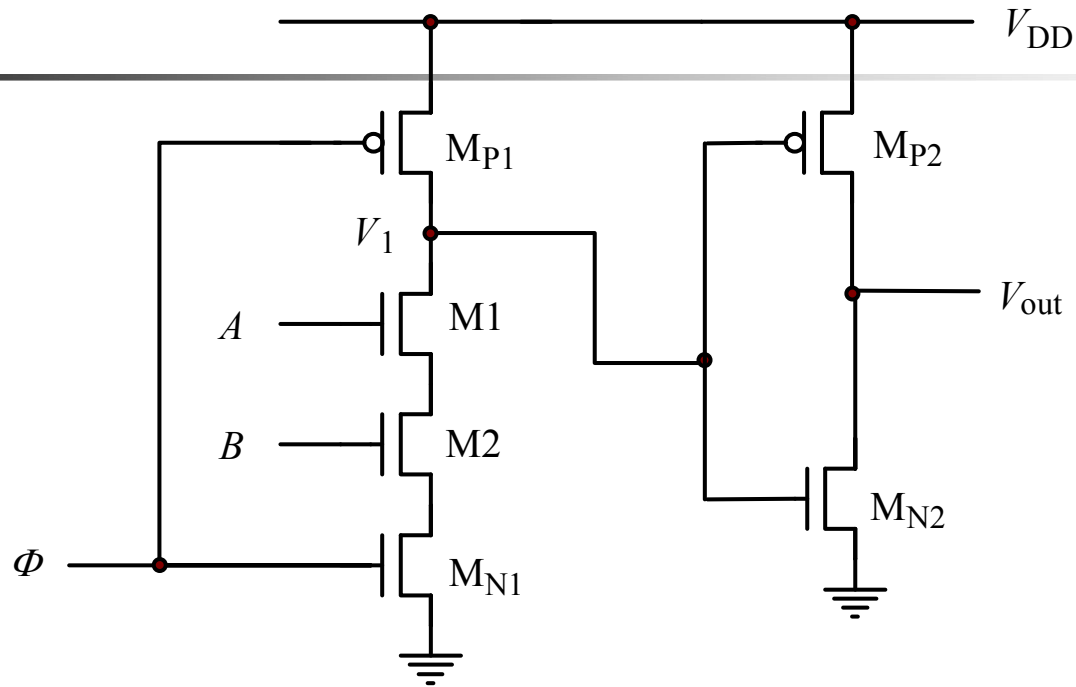


## 第四章 基本单元电路

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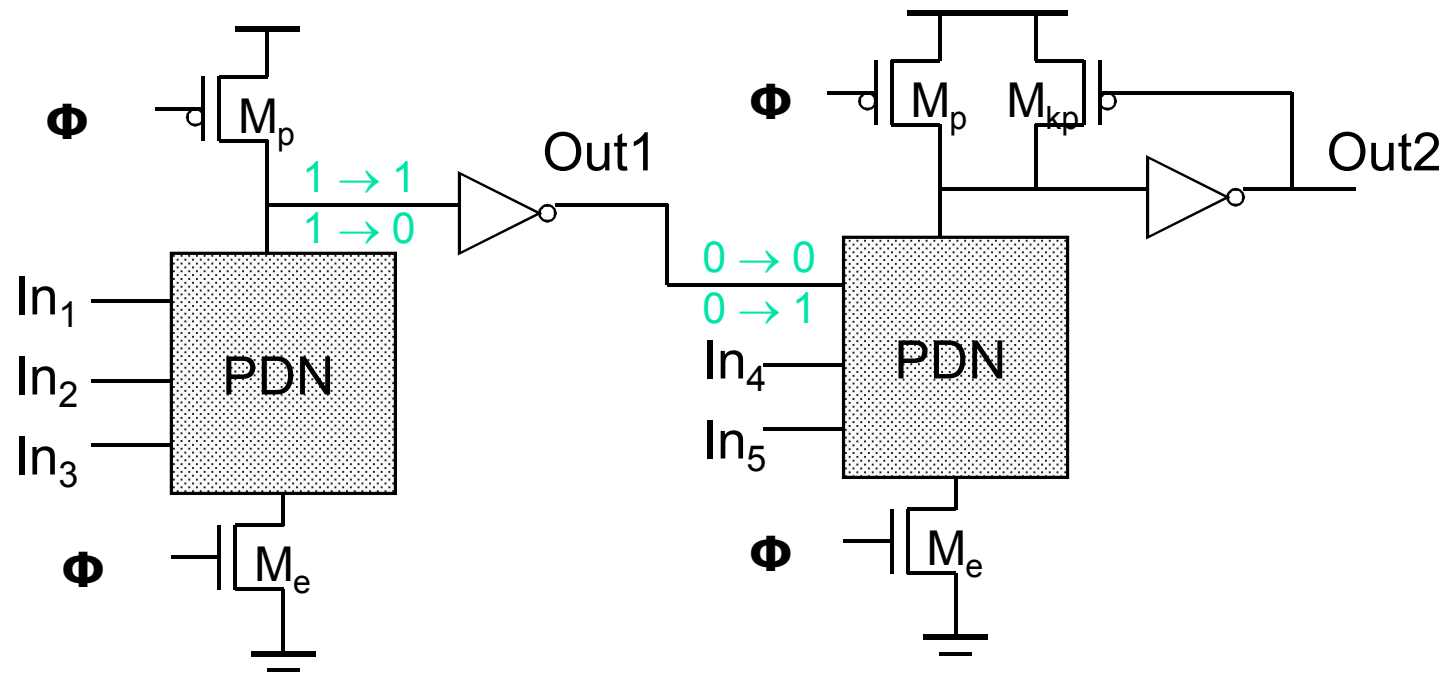
### **4.10 动态逻辑电路--Domino**

## 多米诺（Domino）CMOS电路

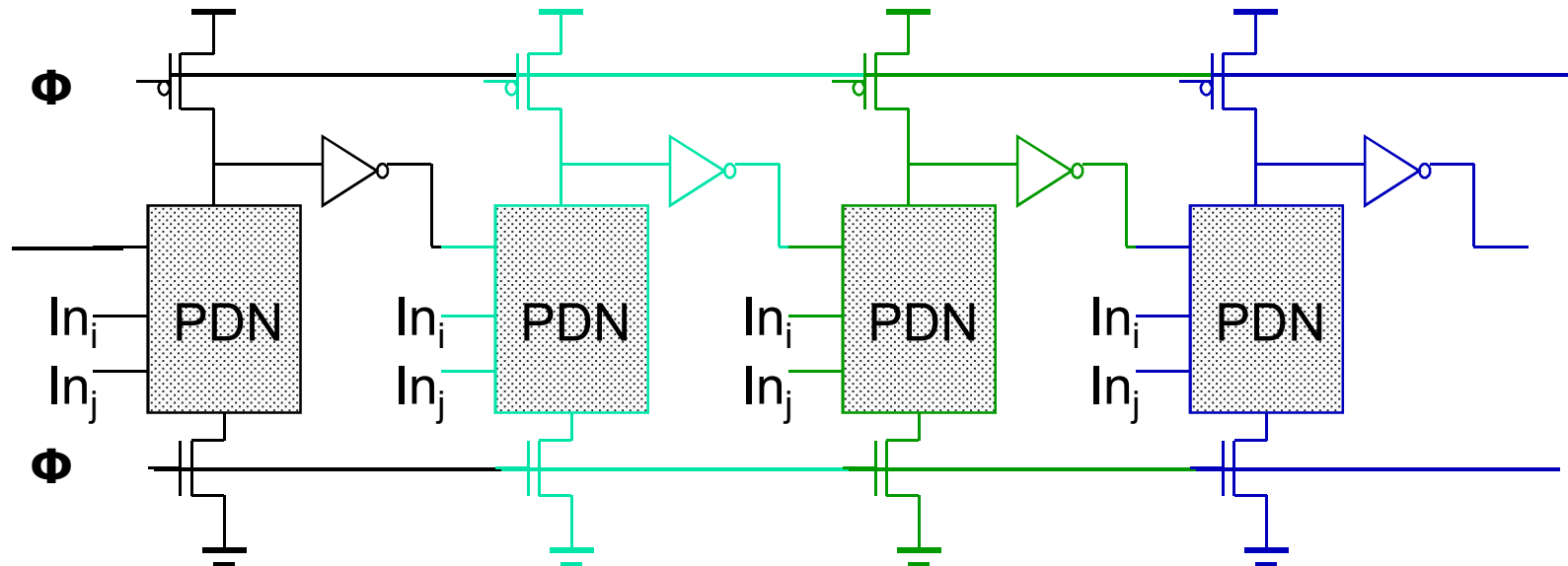


- ✓ 由一级动态逻辑门和一级静态反相器构成
- ✓ 实现不带非逻辑
- ✓ 解决级连问题

# Domino Logic

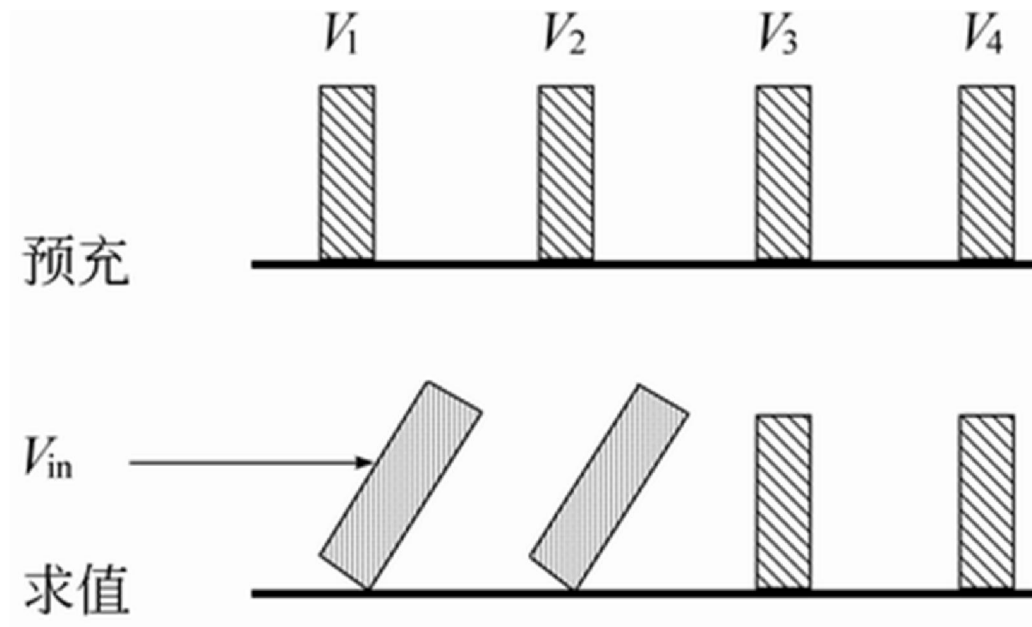


# Why Domino?



Like falling dominos!

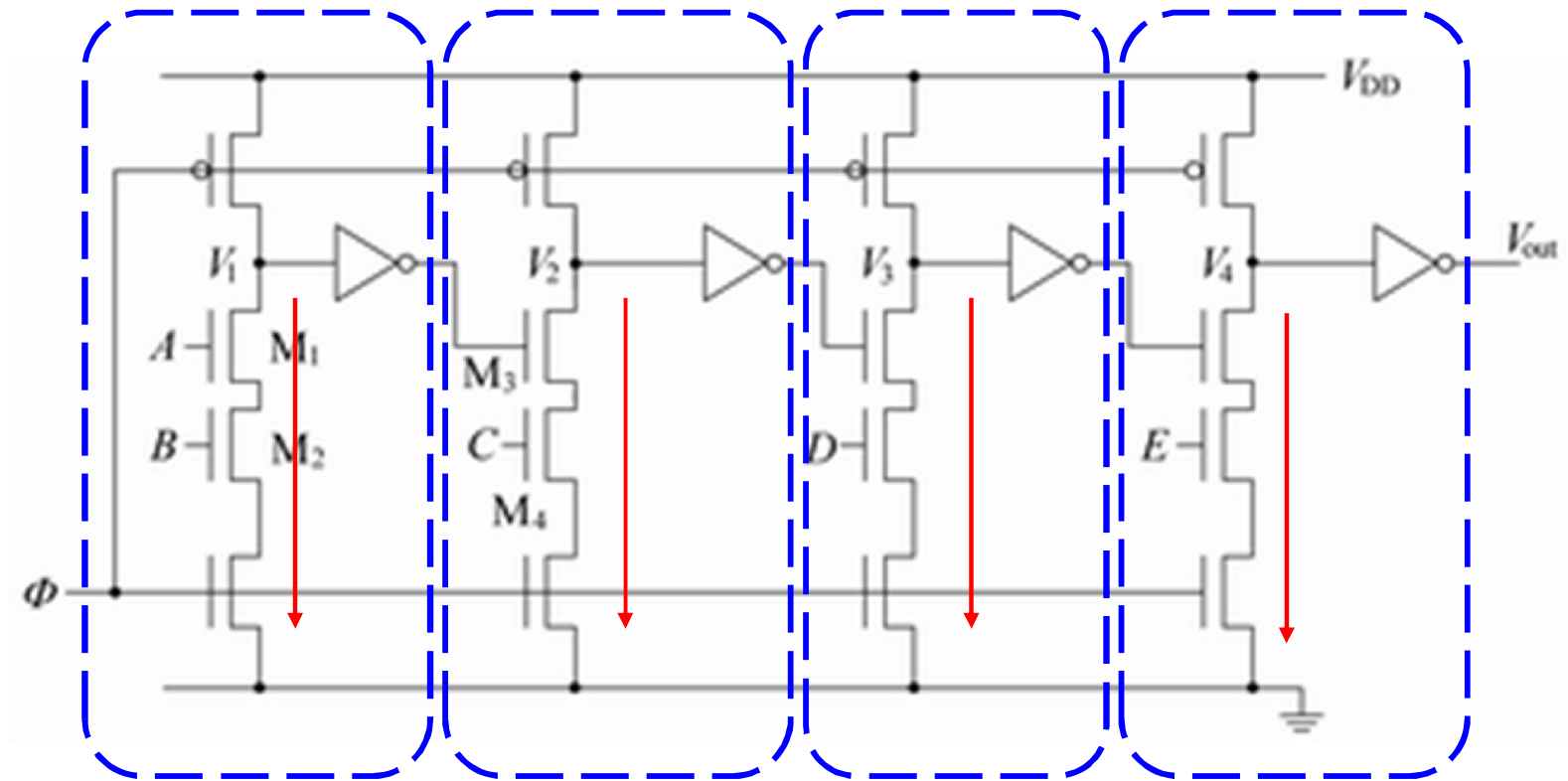
级连电路中，各级信号会通过一级级的连锁反应传递电平。好象多米诺骨牌。



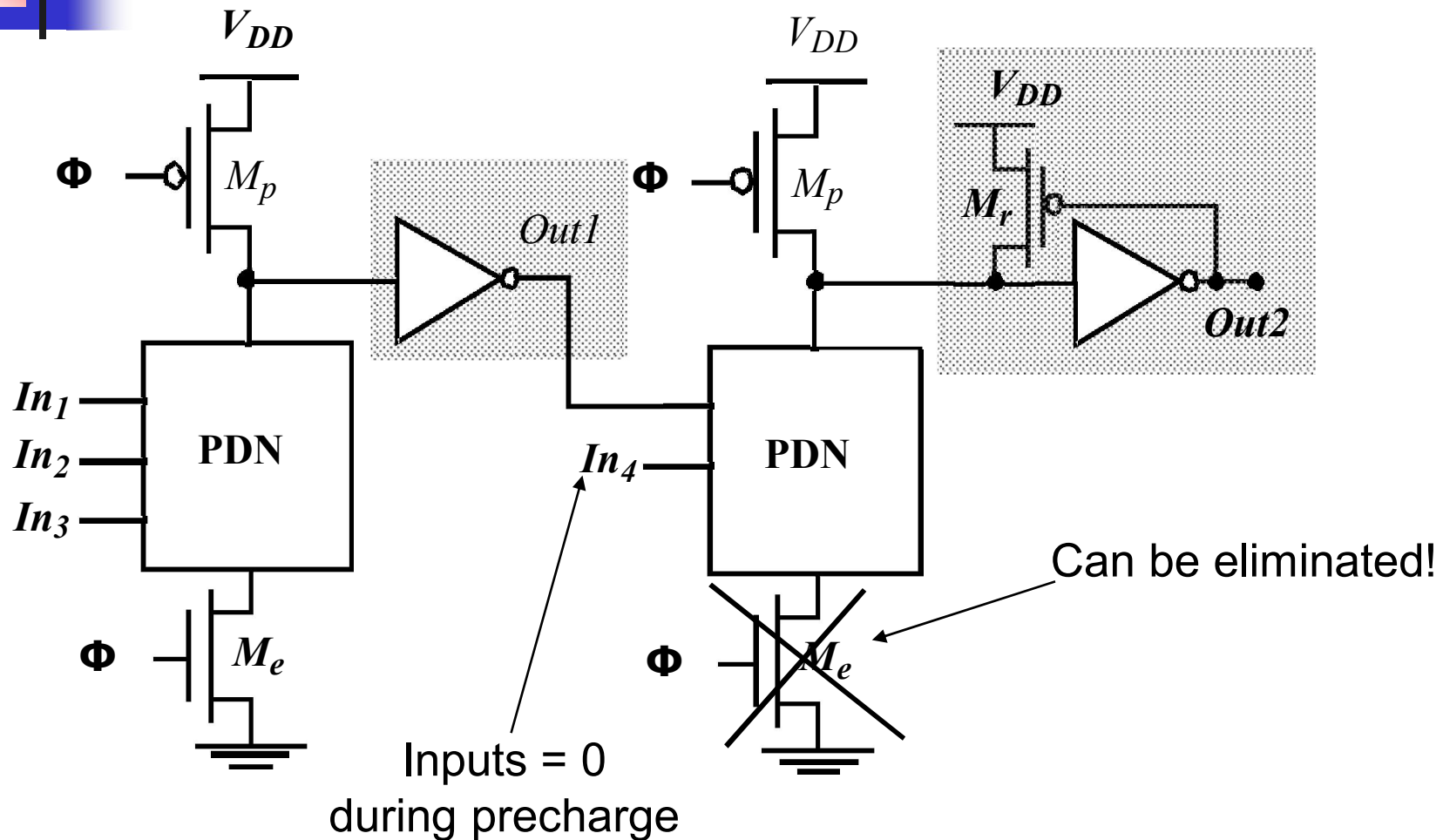
## 多米诺CMOS电路

$\Phi = 0$  V1~V4预充到VDD，与A~E状态无关；

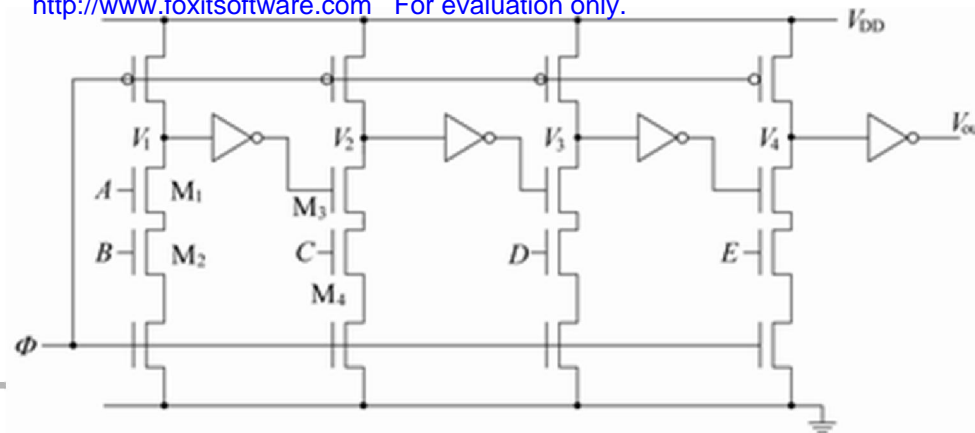
$\Phi = 1$  在A~E=1的情况下，对V1~V4 逐次放电；



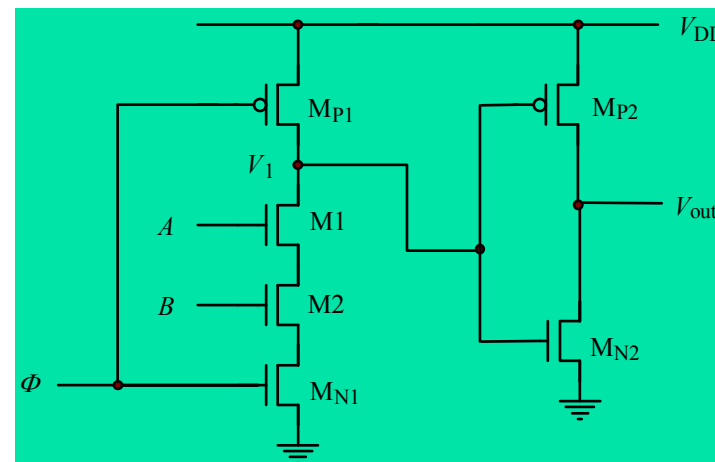
# Designing with Domino Logic



# Domino 逻辑特点

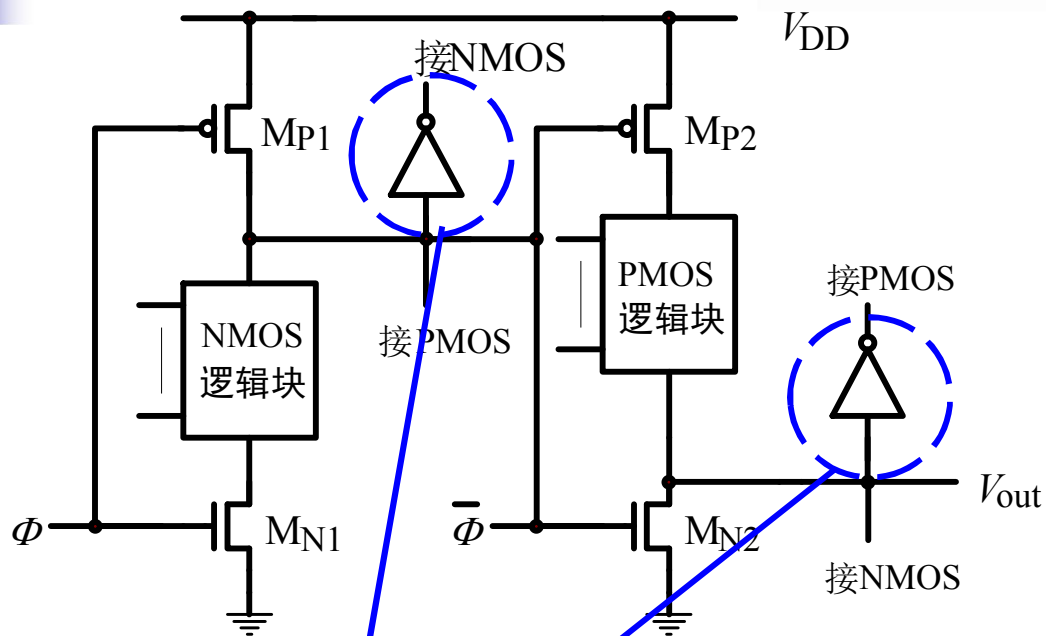
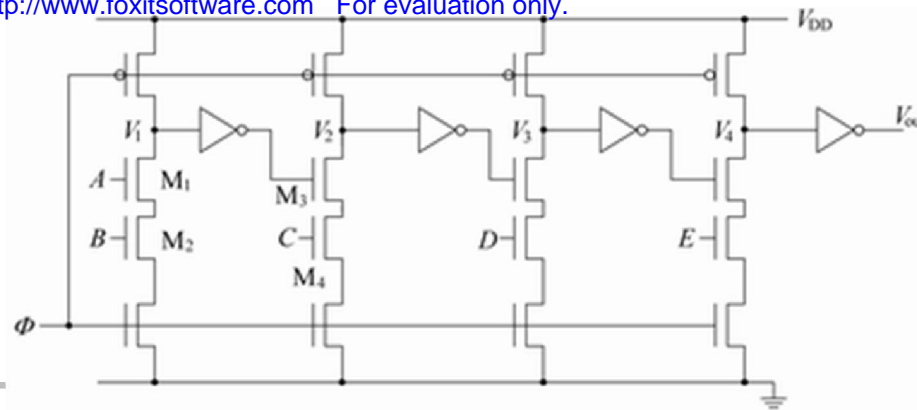


- 通过输出反相器解决动态电路级联问题
- 同互补CMOS相反，Domino只能实现不带非的逻辑
- 高速度
  - 输入和输出电容小
  - 输出反相器中增加PMOS的宽度可以进一步提高速度
- 也有电荷分享、电荷泄漏等问题



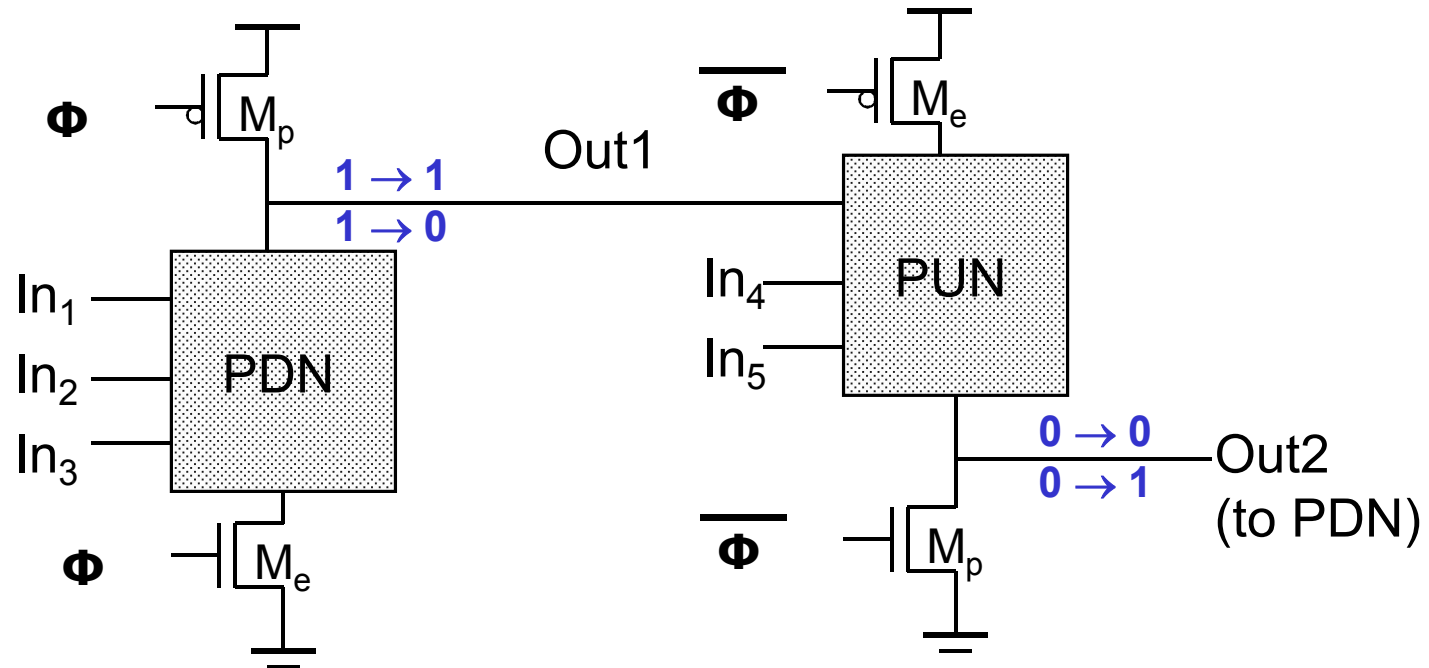


# Domino 逻辑的级联



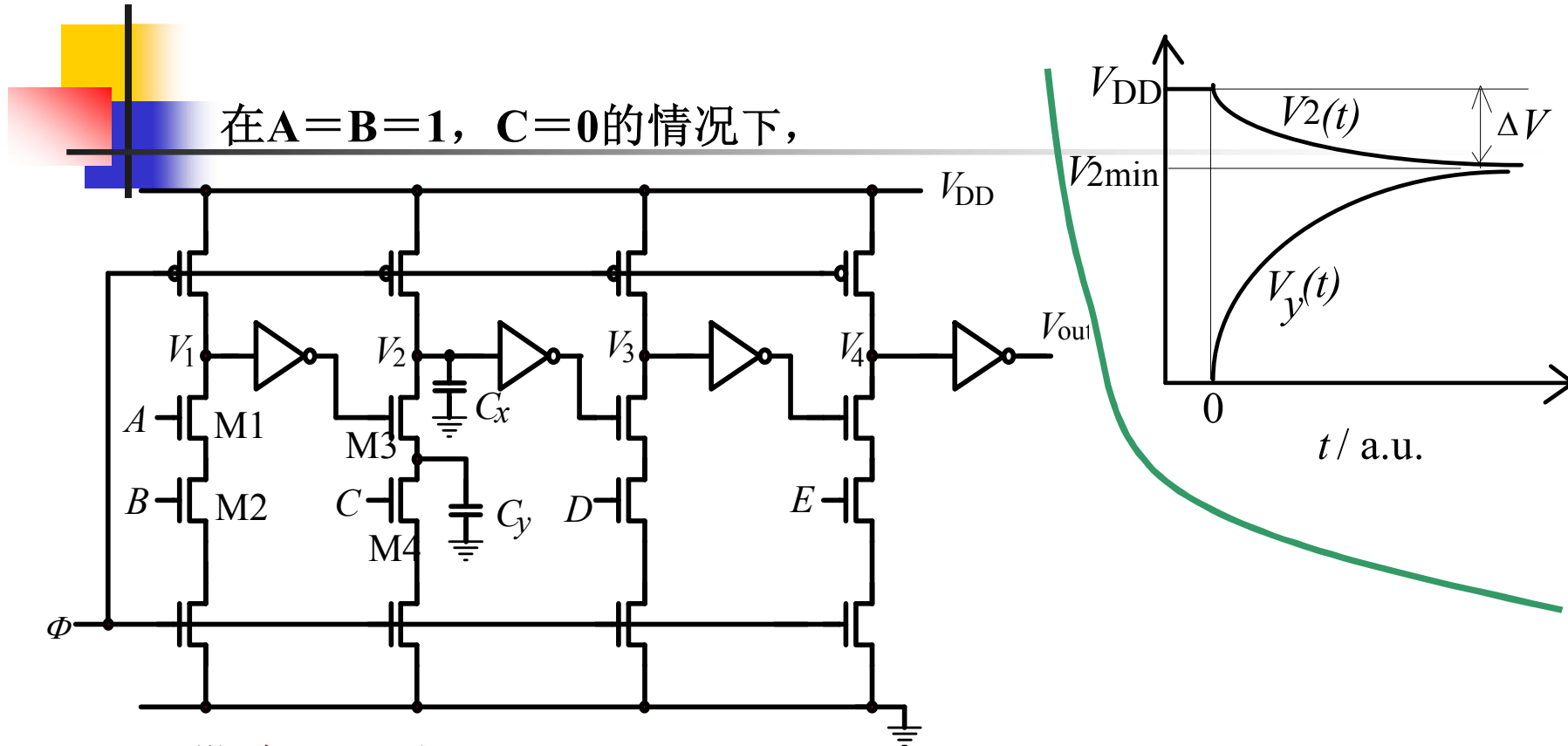
- ✓接同类下级电路要添加反相器
- ✓需要考虑逻辑合理

# np-CMOS



## 电荷分享和电荷泄漏引起结点电平变化

在 $A=B=1, C=0$ 的情况下,

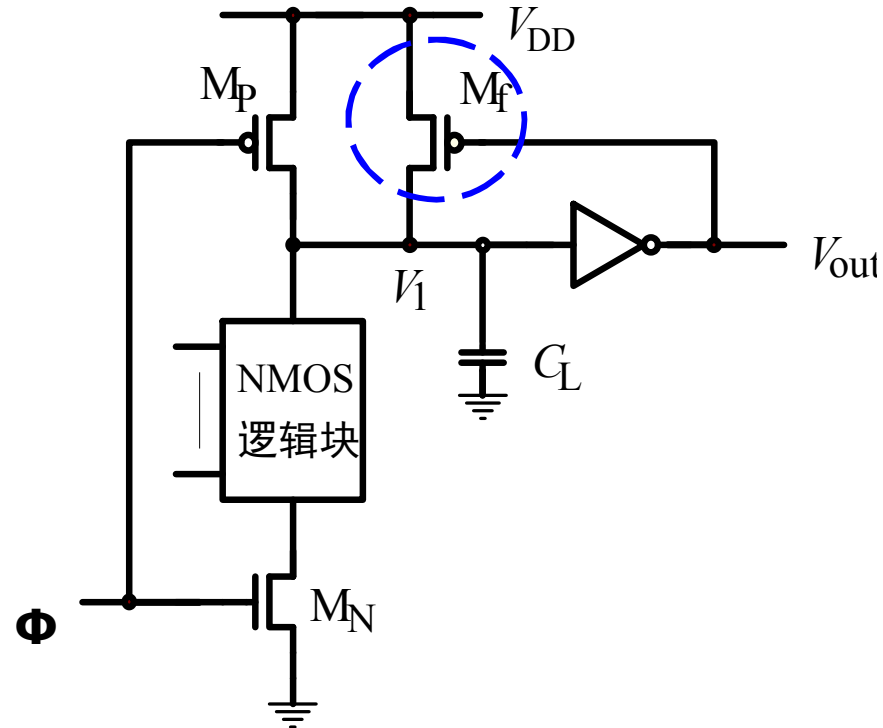


带来以下问题:

- ✓ 使动态电路后面的CMOS反相器的噪声容限下降
- ✓ 使存储的高电平下降, 电路动态保持时间减小

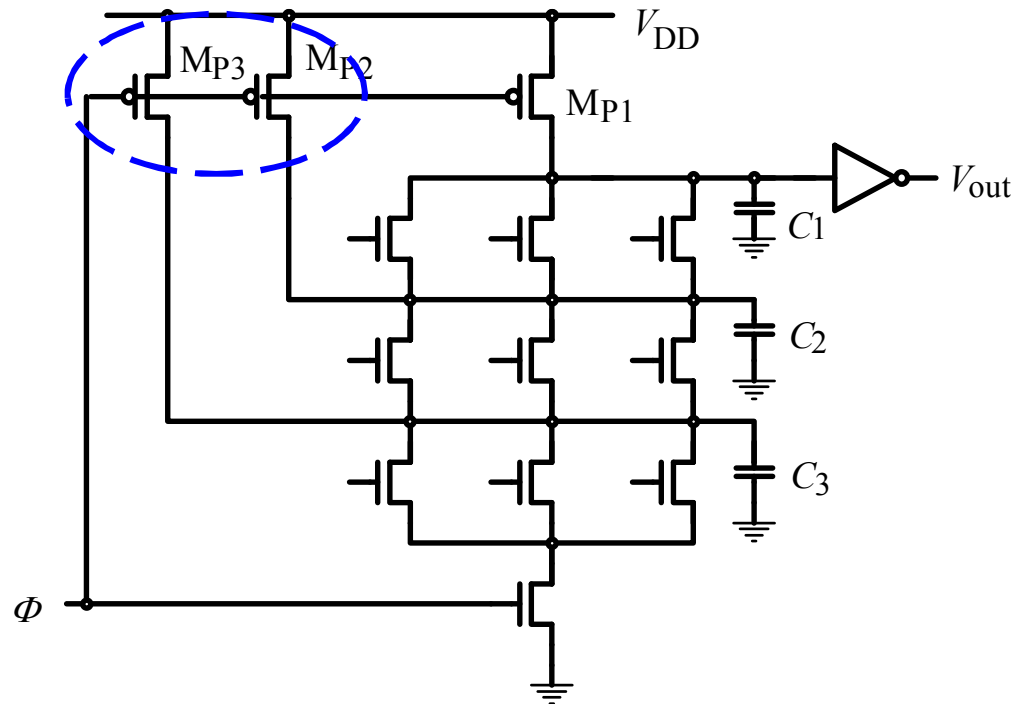
# 电荷泄漏问题

解决方法：加反馈管

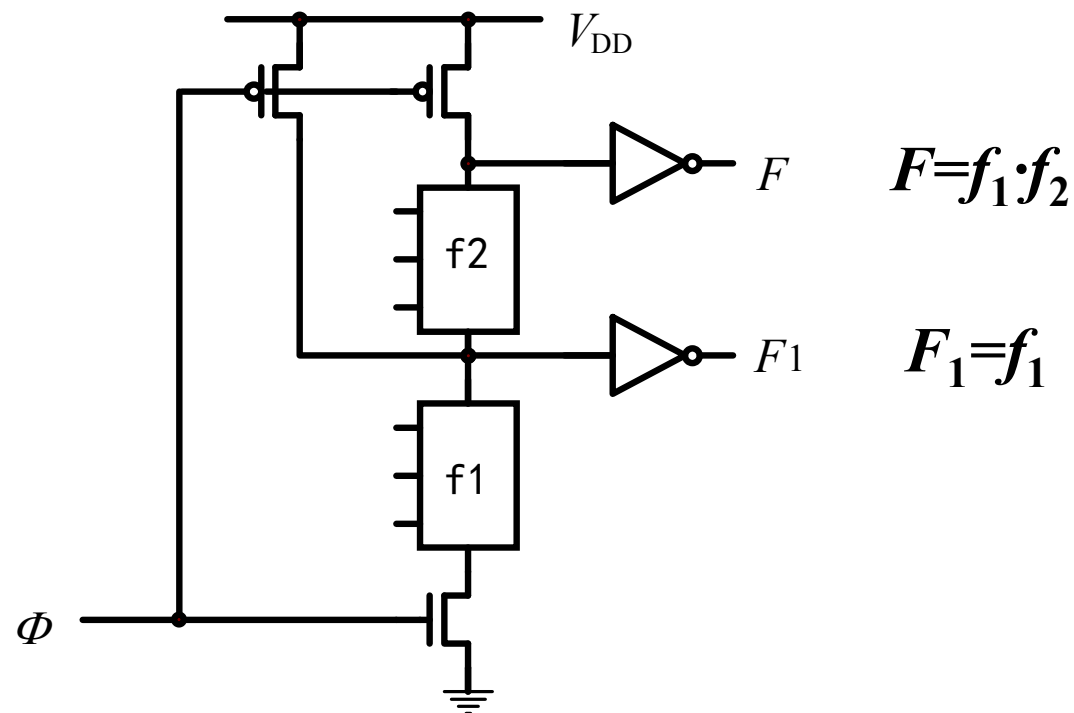


## 电荷分享问题

解决方法：加预充电管

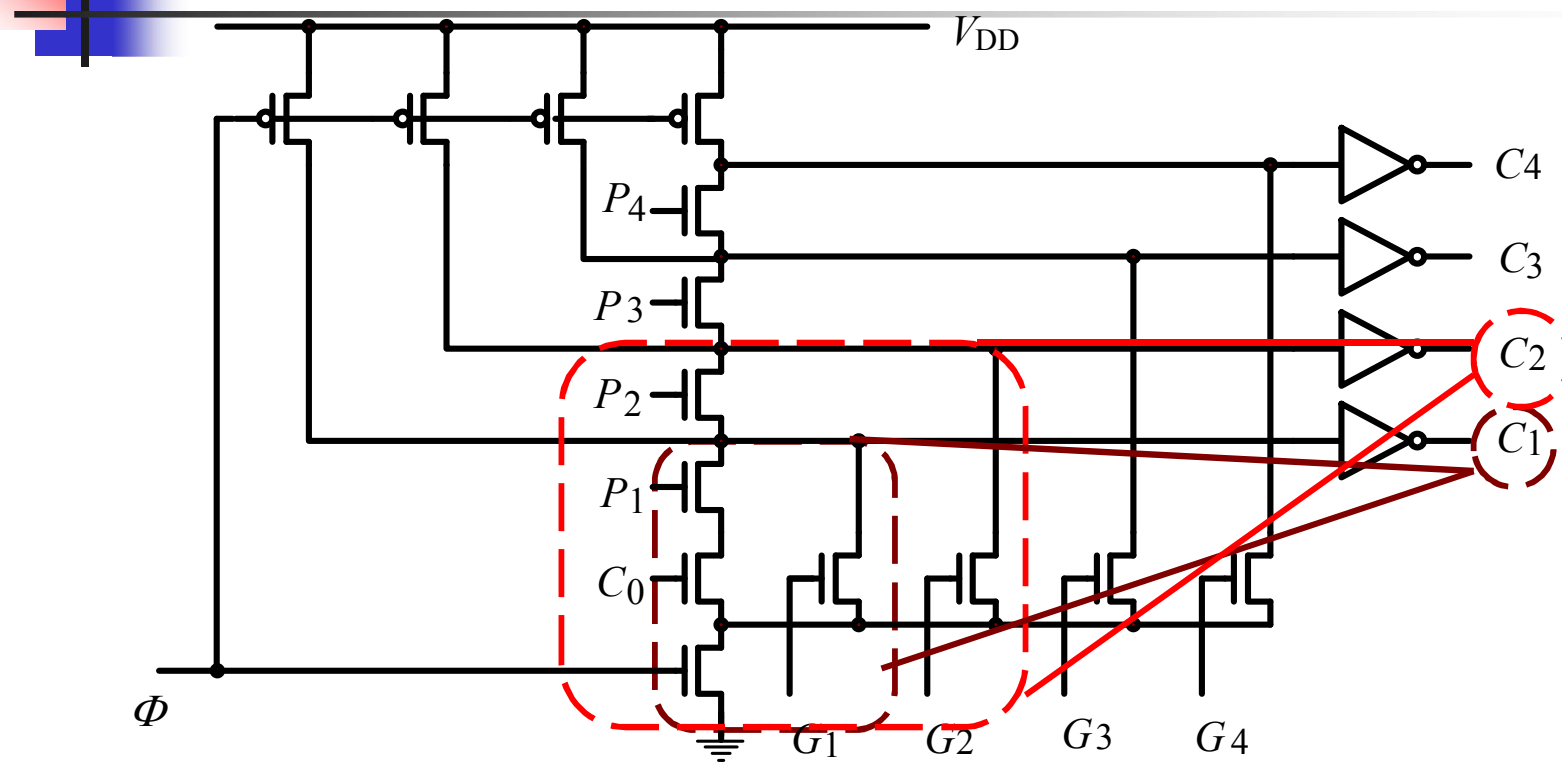


## 多输出多米诺电路 (MODL)



注意：每个输出节点都有预充电的PMOS管

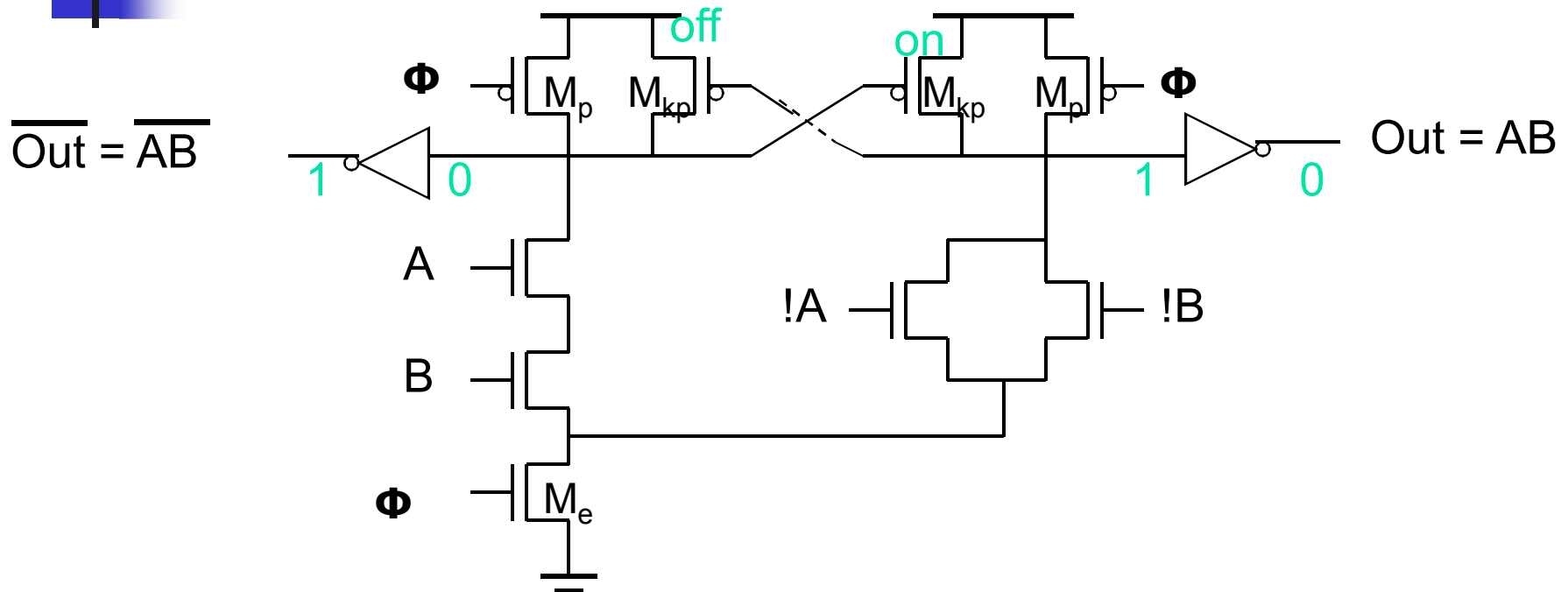
## 多输出多米诺电路实现4位进位链



$$C_i = G_i + P_i C_{i-1}$$

适宜实现有嵌套的函数

# Differential (Dual Rail) Domino



Solves the problem of non-inverting logic