



P1: $fd = \text{popen}("P2.exe", 'w');$ $ffid = \text{mkfifo}("green")$
 send-thrd: $\text{cin} \gg \text{buff};$ open for reading
 $\text{write}(fd, \text{buff}, n);$
 recv-thrd: $\text{read}(ffid, \text{buff}, n);$
 $\text{cout} \ll \text{buff};$

P2: $fd = \text{popen}("P3.exe", 'w');$
~~dup2~~ $\text{dup2}(fd, 1);$
 $\text{while}(1) \{ \text{cin} \gg \text{buff};$
 $\text{cout} \ll \text{buff};$
 $\}$

P3: $ffid = \text{mkfifo}("green");$ open for writing
 $\text{while}(1) \{ \text{cin} \gg \text{buff};$ Capitalize buff
 $\text{cout} \ll \text{buff};$ $\text{buff} = \text{buff} + \text{"from P3"};$
 $\text{write}(ffid, \text{buff}, n);$
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