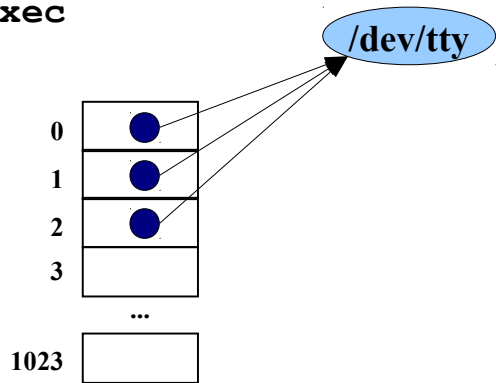


Princeton University / COS 217 / Trace of testdupforkexec

```
% gcc217 testdupforkexec.c -o testdupforkexec
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

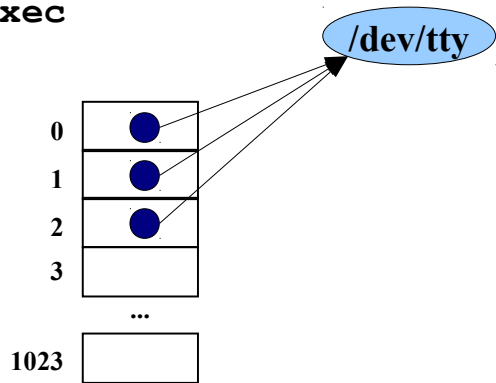


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

...

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

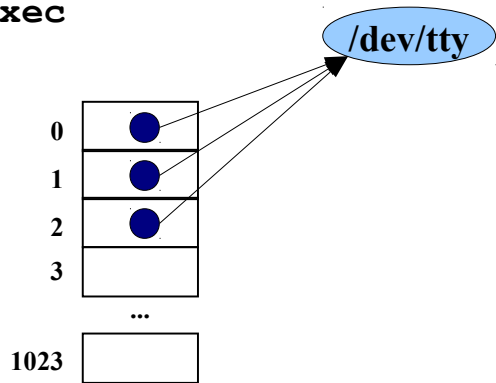


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getpid());
  return 0;
}
```

...

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec



```

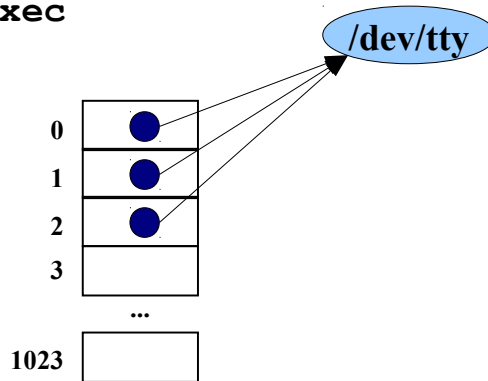
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getPid());
  return 0;
}

```

Writes to stdout (alias
 /dev/tty):
 1140 parent

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

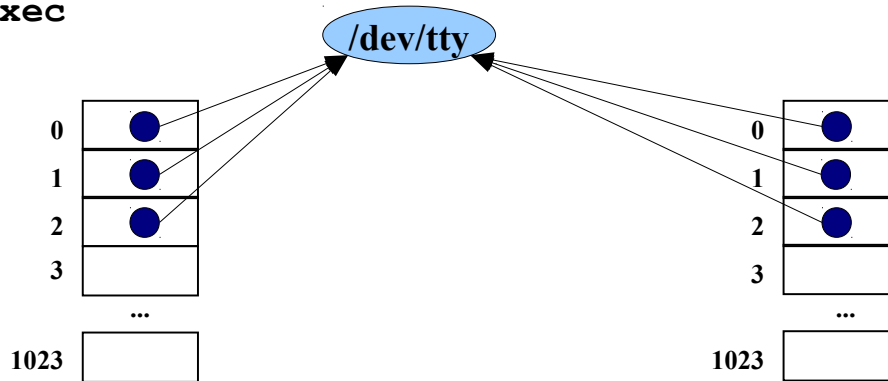


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

...

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

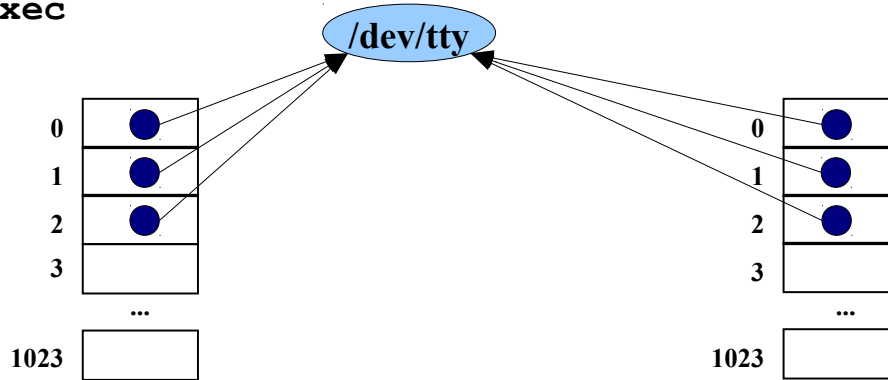


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

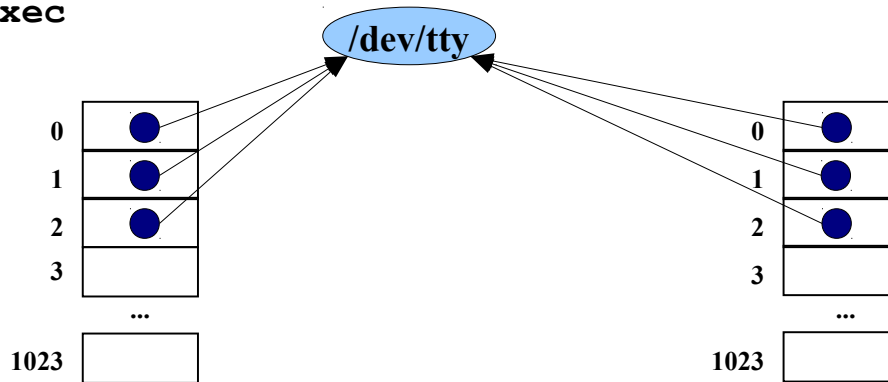


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

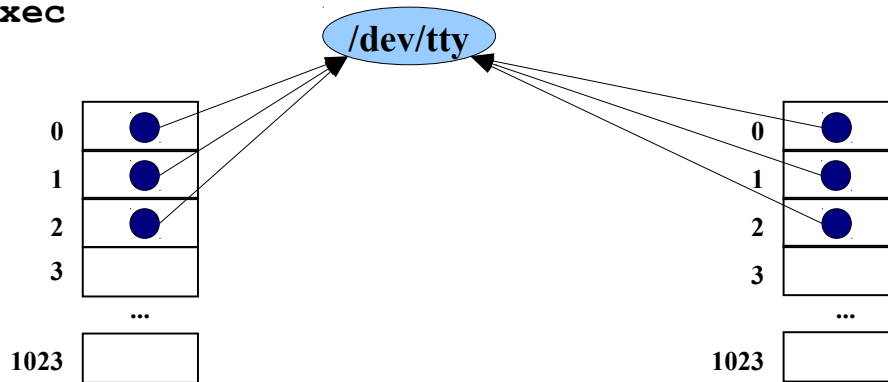


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```


Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

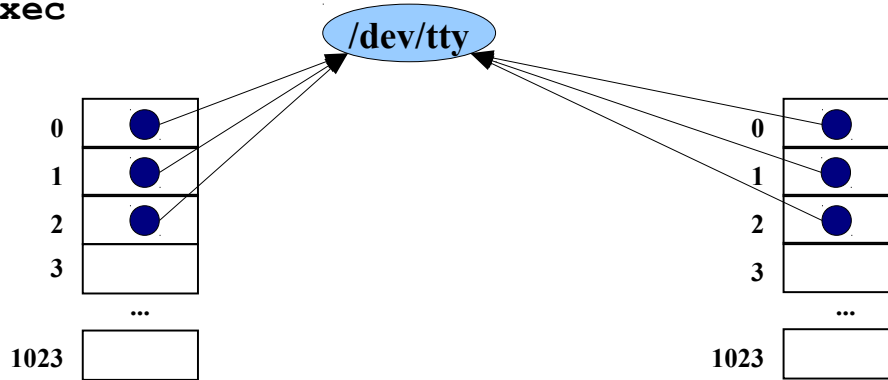


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

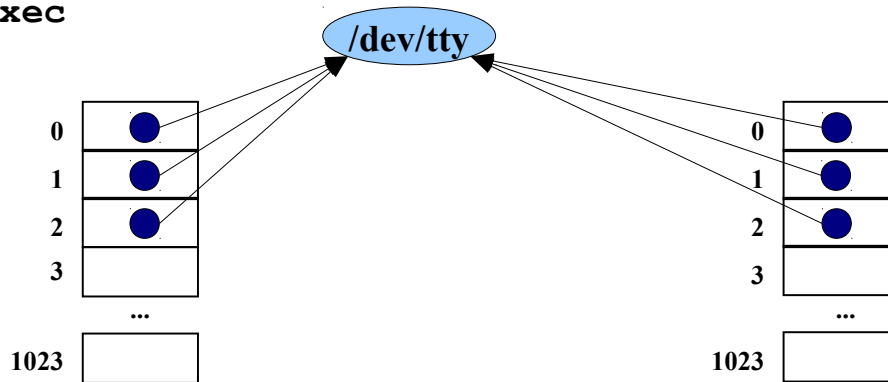


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid = fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile",0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getPid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

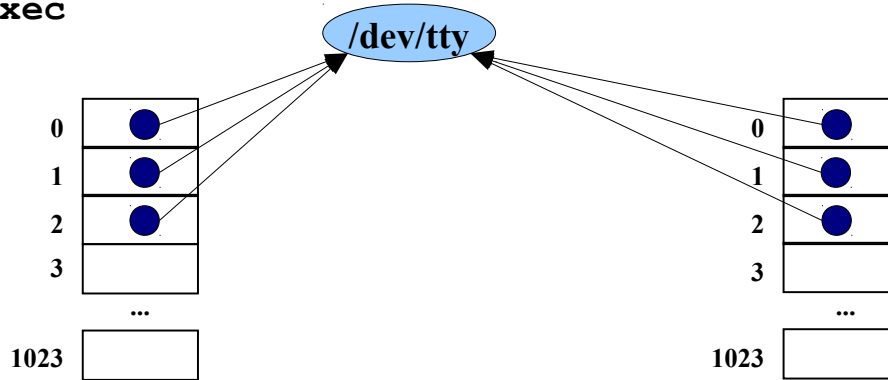


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int) getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int) getpid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

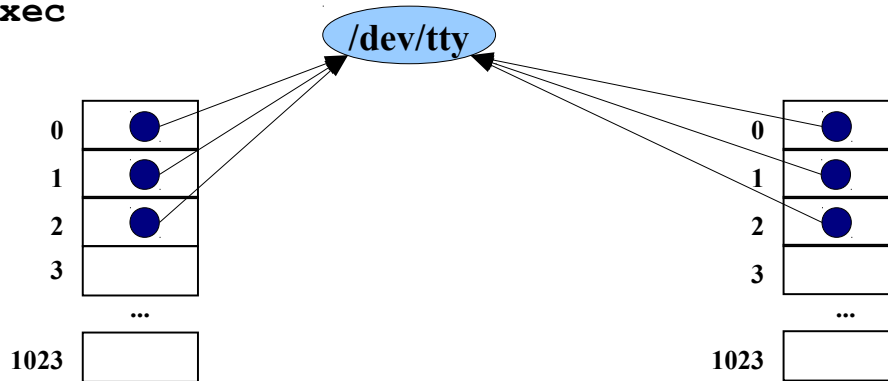


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n", non-zero
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n", 0
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getpid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

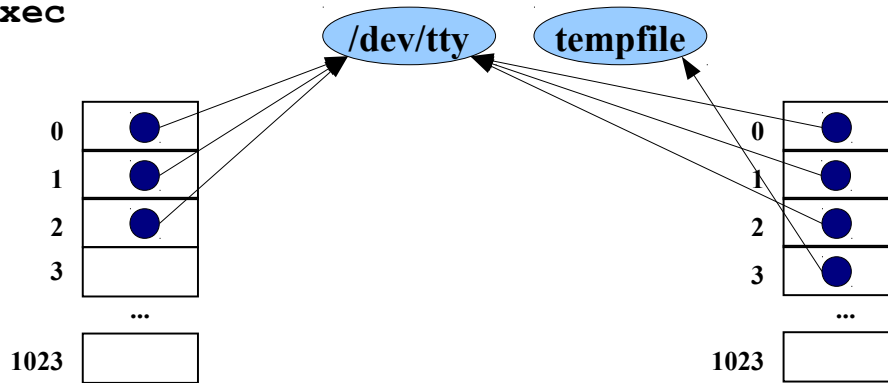


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int) getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int) getpid());
  return 0;
}
```

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% ./testdupforkexec

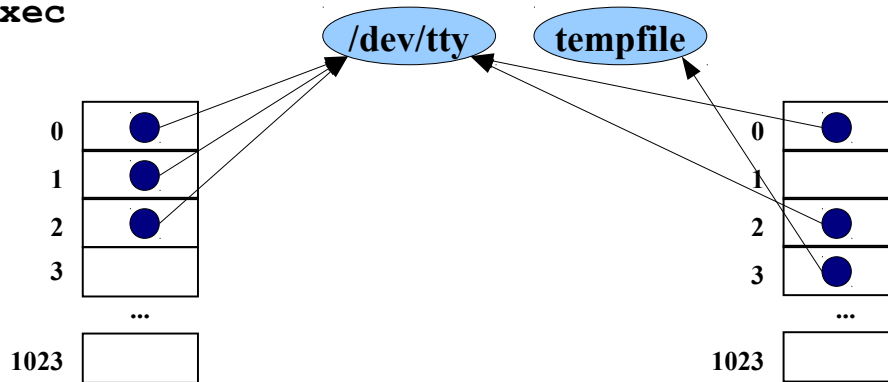


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd ← creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getpid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

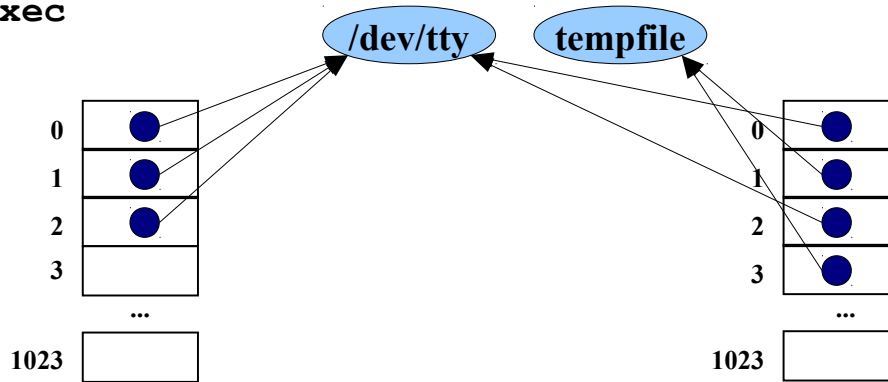


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getpid());
  return 0;
}
```

Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

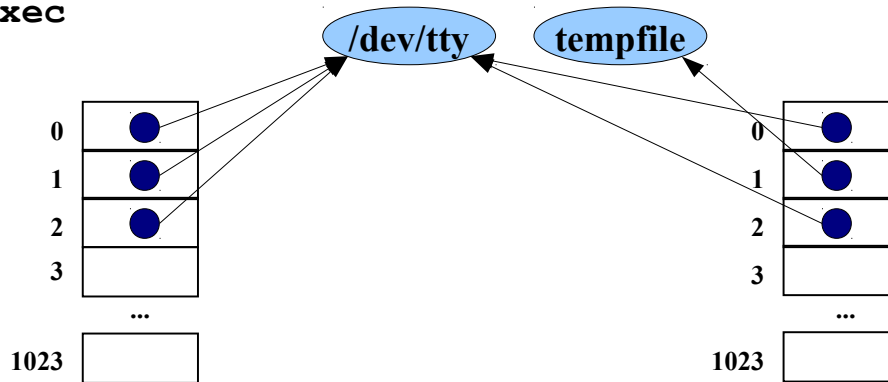


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getPid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd ← creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getPid());
  return 0;
}
```


Princeton University / COS 217 / Trace of testdupforkexec

% ./testdupforkexec

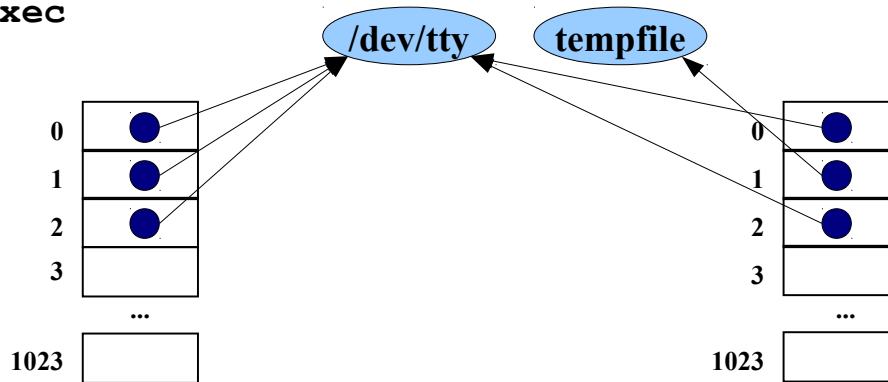


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
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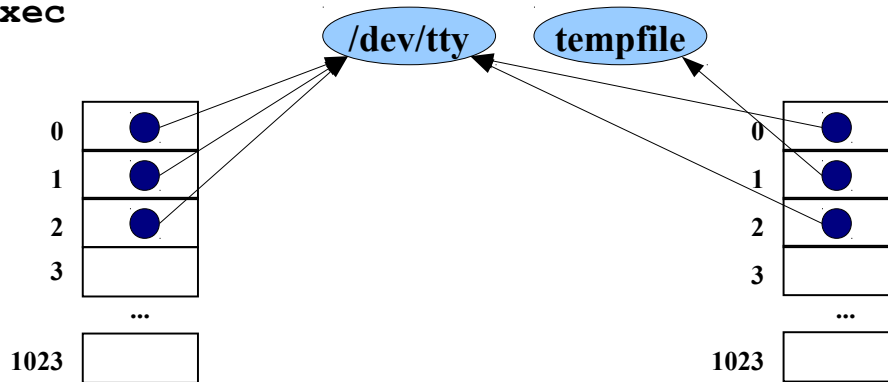


```
int main(int argc, char *argv[])
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         (int) getpid());
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```

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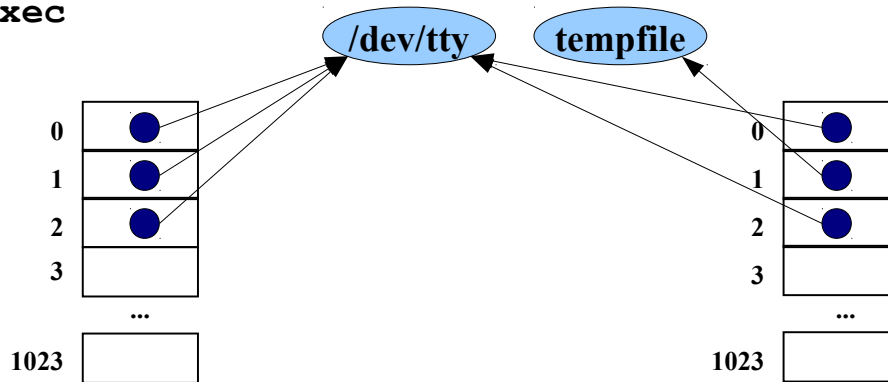


```
int main(int argc, char *argv[])
{ pid_t iPid;
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        (int)getpid());
  fflush(stdin); fflush(stdout);
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    perror(argv[0]);
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  wait(NULL);
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        (int)getpid());
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```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int)getpid());
  fflush(stdin); fflush(stdout);
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  if (iPid == 0)
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    int iFd;
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    dup(iFd);
    close(iFd);
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    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getpid());
  return 0;
}
```

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% ./testdupforkexec

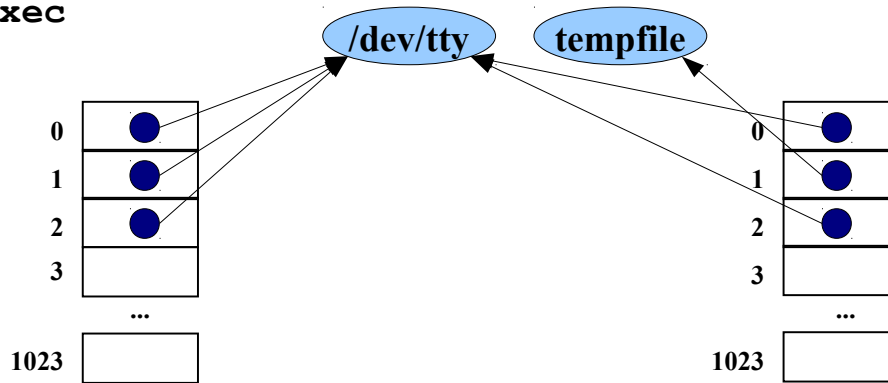


```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
         (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd ← creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
         (int)getpid());
  return 0;
}
```

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% ./testdupforkexec



```

int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n", non-zero
        (int)getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int)getpid());
  return 0;
}

```

```

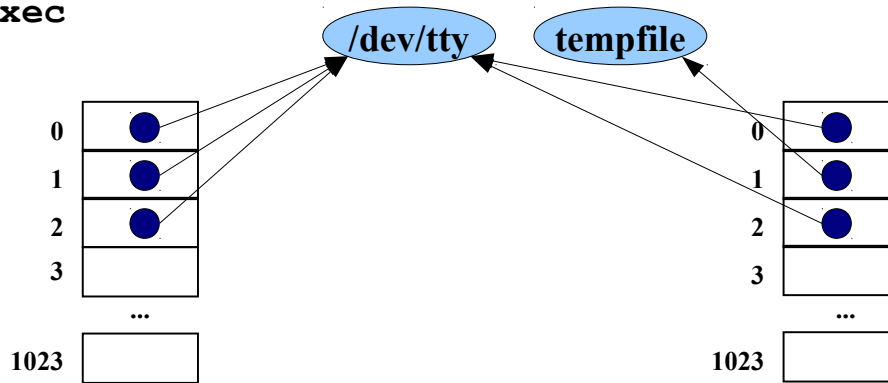
int main(int argc, char *argv[])
{
    Date
    program

    return 0;
}

```

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% ./testdupforkexec



```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n", non-zero
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
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    iFd = creat("tempfile", 0600);
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    dup(iFd);
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    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getpid());
  return 0;
}
```

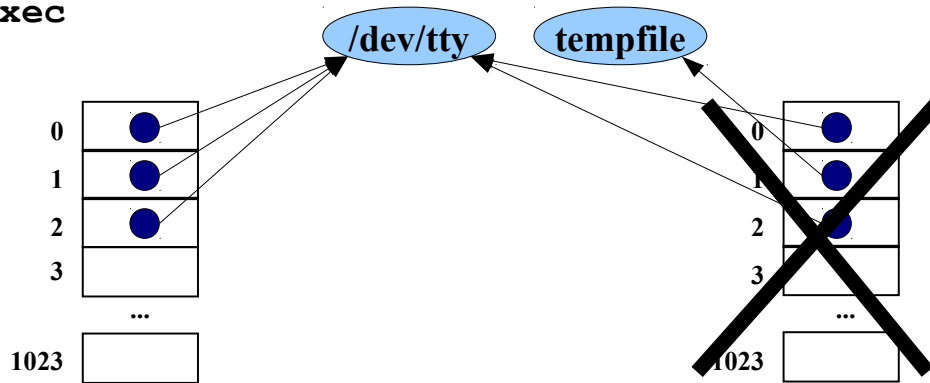
```
int main(int argc, char *argv[])
{
  Date
  program

  return 0;
}
```

Writes the current date/time to stdout (alias tempfile)

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% ./testdupforkexec



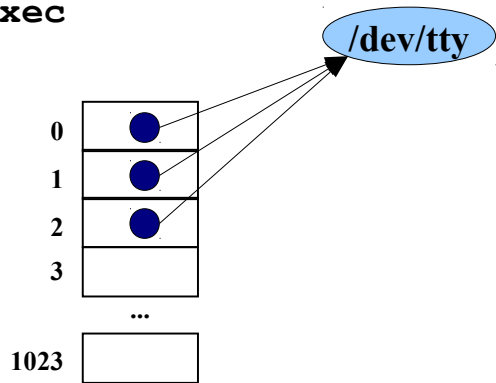
```
int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n", non-zero
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
  { char *apcArgv[2];
    int iFd;
    iFd = creat("tempfile", 0600);
    close(1);
    dup(iFd);
    close(iFd);
    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getpid());
  return 0;
}
```

```
int main(int argc, char *argv[])
{
    Date
    program

    return 0;
}
```

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% ./testdupforkexec



```

int main(int argc, char *argv[])
{ pid_t iPid;
  printf("%d parent\n",
        (int) getpid());
  fflush(stdin); fflush(stdout);
  iPid ← fork();
  if (iPid == 0)
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    apcArgv[0] = "date";
    apcArgv[1] = NULL;
    execvp("date", apcArgv);
    perror(argv[0]);
    exit(EXIT_FAILURE);
  }
  wait(NULL);
  printf("%d parent\n",
        (int) getpid());
  return 0;
}

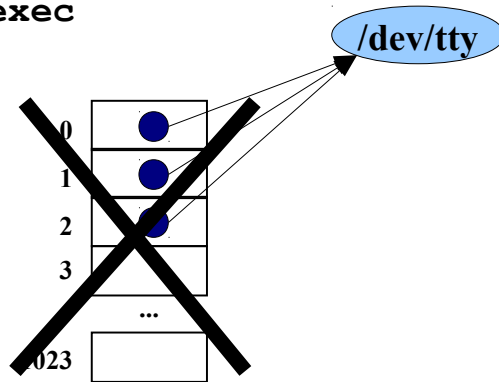
```

non-zero

Writes to stdout (alias
 /dev/tty):
 1140 parent

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% ./testdupforkexec



```
int main(int argc, char *argv[])
{
    pid_t iPid;
    printf("%d parent\n", non-zero
           (int) getpid());
    fflush(stdin); fflush(stdout);
    iPid = fork();
    if (iPid == 0)
    {
        char *apcArgv[2];
        int iFd;
        iFd = creat("tempfile", 0600);
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        apcArgv[0] = "date";
        apcArgv[1] = NULL;
        execvp("date", apcArgv);
        perror(argv[0]);
        exit(EXIT_FAILURE);
    }
    wait(NULL);
    printf("%d parent\n",
           (int) getpid());
    return 0;
}
```

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