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Институт №8 “Компьютерные науки и прикладная математика”
Кафедра №806 “Вычислительная математика и программирование”

Лабораторная работа №8 по курсу
«Операционные системы»

Группа: М8О-215Б-23

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Оценка: _____

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Постановка задачи

Цель работы: Приобретение практических навыков диагностики работы программного обеспечения.

Задание: при выполнении лабораторных работ по курсу ОС необходимо продемонстрировать ключевые системные вызовы, которые в них используются и то, что их использование соответствует варианту ЛР. По итогам выполнения всех лабораторных работ отчет по данной ЛР должен содержать краткую сводку по исследованию написанных программ.

Общий метод и алгоритм решения

Для иллюстрации работы с системными вызовами в операционной системе Windows можно воспользоваться утилитой **NtTrace**.

NtTrace представляет собой инструмент для диагностики, отладки и анализа взаимодействия приложений с ядром операционной системы Windows на уровне **Native API**. Этот инструмент аналогичен **strace** в Linux и позволяет отслеживать вызовы функций, предоставляемых библиотекой **ntdll.dll**. Так как Native API не является официально документированным и может изменяться между версиями Windows, отслеживание работы приложения на этом уровне дает возможность глубже понять его взаимодействие с операционной системой.

NtTrace использует отладочный интерфейс Windows для перехвата вызовов Native API, фиксирует передаваемые аргументы и возвращаемые значения, а также, при возможности, переводит коды возврата в текстовые сообщения об ошибках Windows.

Чаще всего **NtTrace** применяется в следующих случаях:

- Анализ поведения программ, выполняемых в пользовательском пространстве.
- Отладка проблем, возникающих при работе с файлами, процессами, реестром и другими системными ресурсами.
- Поиск причин неожиданного завершения работы программ.
- Исследование взаимодействия приложений с ядром Windows.

Основные возможности NtTrace:

- **Фильтрация вызовов** – с помощью параметра `-filter` можно задать, какие вызовы необходимо отслеживать (например, File, Process, Registry).
- **Отслеживание ошибок** – параметр `-e` позволяет выводить только ошибочные вызовы.
- **Присоединение к уже запущенному процессу** – с помощью `-a` можно подключиться к существующему процессу для его анализа.

- **Вывод стека вызовов** – использование `-stack` позволяет отображать стек вызовов, что полезно для глубокого анализа работы программы.
- **Вывод временных меток** – параметры `-time` и `-delta` позволяют печатать абсолютные и относительные временные метки вызовов.
- **Вывод информации о потоках и процессах** – с помощью `-pid` и `-tid` можно видеть идентификаторы процессов и потоков.
- **Игнорирование загрузки DLL** – опция `-nodlls` исключает отображение операций загрузки и выгрузки динамических библиотек.
- **Запись лога в файл** – параметр `-out` позволяет перенаправить вывод в файл для дальнейшего анализа.

NtTrace – мощный инструмент для анализа поведения приложений в среде Windows. Он предоставляет детальный контроль над выполнением системных вызовов, что делает его незаменимым средством диагностики и отладки программного обеспечения.

Для иллюстрации системных вызовов воспользуемся утилитой `strace` в операционной системе Linux.

`Strace` представляет собой инструмент для диагностики, отладки и обучения в пользовательском пространстве Linux. Он применяется для мониторинга и вмешательства во взаимодействие между процессами и ядром системы, включая системные вызовы, передачу сигналов и изменение состояния процессов. Работа `strace` основана на функции ядра, известной как `ptrace`. Чаще всего `strace` используется для запуска программы с последующим отображением списка выполняемых ею системных вызовов. Это особенно полезно, когда программа часто аварийно завершает работу или ведет себя непредсказуемо; например, `strace` может показать, что программа пытается обратиться к несуществующему или недоступному файлу.

Еще одним полезным применением `strace` является использование опции `-r` для присоединения к уже запущенному процессу. Это может быть необходимо, если процесс перестал отвечать, и `strace` может помочь определить, что процесс зависает при попытке установить сетевое соединение.

Кроме того, `strace` предоставляет множество других возможностей:

- **Фильтрация системных вызовов:** Вы можете указать, какие системные вызовы следует отслеживать, используя параметр `-e trace=`. Это можно сделать по имени (например, `clone`, `fork`, `vfork`), с использованием предопределенных групп (например, `%ipc` или `%file`) или с помощью регулярных выражений (начиная с версии `strace 4.17`, например, `-e trace=/clock_.*`).
- **Трассировка путей:** Вы можете указать список путей для трассировки, используя параметр `-P` (например, `-P /etc/ld.so.cache`).
- **Выгрузка ввода-вывода:** Вы можете указать список файловых дескрипторов для выгрузки ввода-вывода, используя параметры `-e read=` и `-e write=`.

- **Подсчет времени выполнения:** Strace позволяет подсчитывать время выполнения системных вызовов и их количество, используя параметры -T, -c, -C и -w. Параметр -U позволяет выводить дополнительную информацию, такую как минимальное и максимальное время выполнения системного вызова.

- **Временные метки:** Strace может печатать относительные или абсолютные временные метки, используя опции -t и -r.

- **Изменение системных вызовов:** Strace позволяет изменять выполняемые системные вызовы, включая изменение возвращаемого значения и кода ошибки, внедрение сигналов, задержек и изменение данных, на которые указывают аргументы системных вызовов. Это достигается с помощью опции -e inject=syscall specification:tampering specification:retval=:error=:signal=:delay_enter=:delay_exit=:poke_enter=:poke_exit=.

- **Информация о дескрипторах файлов:** Strace может извлекать информацию о дескрипторах файлов, включая сокеты, используя опцию -u. Опция -uu предоставляет дополнительную информацию, такую как адреса конечных точек для сокетов, пути и основные/дополнительные номера устройств для файлов.

- **Трассировка стека:** Strace может печатать трассировки стека, включая разборку символов (начиная с версии strace 4.21, используя опцию -k).

Strace также поддерживает множество других опций и параметров, которые делают его мощным инструментом для диагностики и отладки программного обеспечения.

Протокол работы программы

Лабораторная работа №1.

C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main>NtTrace -filter Process

C:\Users\klosh\Desktop\OS\build\ParentProcess.exe

Process 8076 starting at 00000000004014E0 with command line:

"C:\Users\klosh\Desktop\OS\build\ParentProcess.exe"

C:\Users\klosh\Desktop\OS\build\ParentProcess.exe

Loaded DLL at 00007FFB53B30000 ntdll.dll

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x61f418, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x7ffb53cb7268, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x61f328, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x61f380, Length=4, ReturnLength=null) => 0

Loaded DLL at 00007FFB52860000 C:\WINDOWS\System32\KERNEL32.DLL

Loaded DLL at 00007FFB514B0000 C:\WINDOWS\System32\KERNELBASE.dll

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x23 [ProcessTlsInformation], ProcessInformation=0x61ed40, Length=0x28) => 0

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x31 [ProcessOwnerInformation], ProcessInformation=0x61ea98, Length=8) => 0

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0x8, TokenHandle=0x61e980 [0x6c]) => 0

NtSetWnfProcessNotificationEvent(NotificationEvent=0x80) => 0

Loaded DLL at 00007FFB52530000 C:\WINDOWS\System32\msvcrt.dll

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x23 [ProcessTlsInformation], ProcessInformation=0x61f090, Length=0x28) => 0

Initial breakpoint

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0x8, TokenHandle=0x61f320 [0xa8]) =>

0

Enter the name of the file: ..\test\test_input.txt

Loaded DLL at 00007FFB527B0000 C:\WINDOWS\System32\sechost.dll

Loaded DLL at 00007FFB51310000 C:\WINDOWS\System32\bcrypt.dll

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x56

[ProcessEnclaveInformation], ProcessInformation=0x61ce20, Length=0xb0, ReturnLength=null) =>

0xc0000003 [87 '???????? ???? ??????']

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0

[ProcessBasicInformation], ProcessInformation=0x61cda0, Length=0x40, ReturnLength=null) => 0

NtCreateUserProcess(ProcessHandle=0x61dea0 [0xe4], ThreadHandle=0x61df20 [0xe0],

ProcessDesiredAccess=MAXIMUM_ALLOWED,

ThreadDesiredAccess=MAXIMUM_ALLOWED, ProcessObjectAttributes=null,

ThreadObjectAttributes=null, ProcessFlags=0x204, ThreadFlags=1, ProcessParameters=0xe2660

["C:\Users\klosh\Desktop\OS\build\ChildProcess.exe"], CreateInfo=0x61e1d0,

AttributeList=0x61e670) => 0 (вызов, который инициирует создание дочернего

процесса ChildProcess.exe)

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0xa, TokenHandle=0x61da70 [0xf0]) => 0

NtQueryInformationProcess(ProcessHandle=0xe4, ProcessInformationClass=0x3c

[ProcessCommandLineInformation], ProcessInformation=0xdfd80, Length=0x400,

ReturnLength=0x61da40 [0x60]) => 0

NtQueryInformationProcess(ProcessHandle=0xe4, ProcessInformationClass=0

[ProcessBasicInformation], ProcessInformation=0x61dce0, Length=0x40, ReturnLength=null) => 0

Loaded DLL at 00007FFB4B680000 C:\WINDOWS\system32\apphelp.dll

Process 12556 starting at 0000000004014E0 with command line: "ChildProcess.exe

..\test\test_input.txt"

C:\Users\klosh\Desktop\OS\build\ChildProcess.exe

Loaded DLL at 00007FFB53B30000 ntdll.dll

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie],

ProcessInformation=0x61f418, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x7ffb53cb7268, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x61f328, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie], ProcessInformation=0x61f380, Length=4, ReturnLength=null) => 0

Loaded DLL at 00007FFB52860000 C:\WINDOWS\System32\KERNEL32.DLL

Loaded DLL at 00007FFB514B0000 C:\WINDOWS\System32\KERNELBASE.dll

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x23 [ProcessTlsInformation], ProcessInformation=0x61ed40, Length=0x28) => 0

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x31 [ProcessOwnerInformation], ProcessInformation=0x61ea98, Length=8) => 0

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0x8, TokenHandle=0x61e980 [0x68]) => 0

NtSetWnfProcessNotificationEvent(NotificationEvent=0x7c) => 0

Loaded DLL at 00007FFB4B680000 C:\WINDOWS\SYSTEM32\apphelp.dll

NtOpenProcess(ProcessHandle=0x61eb58 [0xbc], DesiredAccess=0x1000, ObjectAttributes=null, ClientId=0x61eaf0 [0x310c/0]) => 0

NtOpenProcessToken(ProcessHandle=0xbc, DesiredAccess=0x8, TokenHandle=0x61ead0 [0xc0]) => 0

Loaded DLL at 00007FFB52530000 C:\WINDOWS\System32\msvcrt.dll

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x23 [ProcessTlsInformation], ProcessInformation=0x61f090, Length=0x28) => 0

Initial breakpoint

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0x8, TokenHandle=0x61f320 [0xc4]) => 0

NtTerminateProcess(ProcessHandle=0, ExitStatus=1) => 0

Process 12556 exit code: 1 (завершился дочерний процесс)

NtTerminateProcess(ProcessHandle=0, ExitStatus=0) => 0

Process 8076 exit code: 0 (завершился родительский процесс)

Лабораторная работа №2.

C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main>NtTrace -filter File,Process

C:\Users\klosh\Desktop\OS2\build\MatrixMultiplication.exe C:\Users\klosh\Desktop\OS2\tests\input.txt
3

Process 12016 starting at 00000000004014E0 with command line:

"C:\Users\klosh\Desktop\OS2\build\MatrixMultiplication.exe

C:\Users\klosh\Desktop\OS2\tests\input.txt 3"

C:\Users\klosh\Desktop\OS2\build\MatrixMultiplication.exe

Loaded DLL at 00007FFC84D90000 ntdll.dll

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie],
ProcessInformation=0x61f418, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie],
ProcessInformation=0x7ffc84f17268, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie],
ProcessInformation=0x61f328, Length=4, ReturnLength=null) => 0

NtQueryInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x24 [ProcessCookie],
ProcessInformation=0x61f380, Length=4, ReturnLength=null) => 0

NtOpenFile(FileHandle=0x61f398 [0x5c], DesiredAccess=SYNCHRONIZE|0x20,
ObjectAttributes="\??\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\", IoStatusBlock=0x61f308
[0/1], ShareAccess=3, OpenOptions=0x21) => 0

NtQueryVolumeInformationFile(FileHandle=0x5c, IoStatusBlock=0x61f308 [0/8],
FsInformation=0x61f2f0, Length=8, FsInformationClass=4 [FsDeviceInformation]) => 0

Loaded DLL at 00007FFC83D60000 C:\WINDOWS\System32\KERNEL32.DLL

Loaded DLL at 00007FFC821C0000 C:\WINDOWS\System32\KERNELBASE.dll

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x23 [ProcessTlsInformation],
ProcessInformation=0x61ed40, Length=0x28) => 0

NtInitializeNlsFiles(BaseAddress=0x61eac0 [0x000c0000], DefaultLocaleId=0x7ffc82528b88 [0x409],
DefaultCasingTableSize=null) => 0

NtCreateFile(FileHandle=0x61eb28 [0x60],
DesiredAccess=READ_CONTROL|SYNCHRONIZE|0x19f, ObjectAttributes=4:"\Connect",
IoStatusBlock=0x61e4e0 [0/0x18], AllocationSize=null, FileAttributes=0, ShareAccess=7,
CreateDisposition=2, CreateOptions=0x20, EaBuffer=0x6e6800, EaLength=0x54b) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x61ea70 [0/0], IoControlCode=0x00500023, InputBuffer=null, InputBufferLength=0,
OutputBuffer=0x61ea90, OutputBufferLength=8) => 0

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x31
[ProcessOwnerInformation], ProcessInformation=0x61ea98, Length=8) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e860, IoControlCode=0x00500016, InputBuffer=0x61e870, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0xc00700bb [187 '?? ?????? ???????? ???? ?????? ????????']

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0x8, TokenHandle=0x61e980 [0x74]) => 0

NtSetWnfProcessNotificationEvent(NotificationEvent=0x84) => 0

Loaded DLL at 00007FFC845E0000 C:\WINDOWS\System32\msvcrt.dll

NtSetInformationProcess(ProcessHandle=-1, ProcessInformationClass=0x23 [ProcessTlsInformation], ProcessInformation=0x61f090, Length=0x28) => 0

Initial breakpoint

NtOpenProcessToken(ProcessHandle=-1, DesiredAccess=0x8, TokenHandle=0x61f320 [0xb0]) => 0

NtQueryVolumeInformationFile(FileHandle=0x54, IoStatusBlock=0x61f070 [0/8], FsInformation=0x61f090, Length=8, FsInformationClass=4 [FsDeviceInformation]) => 0

NtQueryVolumeInformationFile(FileHandle=0x150, IoStatusBlock=0x61f070 [0/8], FsInformation=0x61f090, Length=8, FsInformationClass=4 [FsDeviceInformation]) => 0

NtQueryVolumeInformationFile(FileHandle=0x64, IoStatusBlock=0x61f070 [0/8], FsInformation=0x61f090, Length=8, FsInformationClass=4 [FsDeviceInformation]) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61df40 [0/0], IoControlCode=0x00500016, InputBuffer=0x61df50, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0

Reading matrices from file: C:\Users\klosh\Desktop\OS2\tests\input.txt

NtWriteFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e0e0 [0/0x48], Buffer=0x61e180, Length=0x48, ByteOffset=null, Key=null) => 0

NtCreateFile(FileHandle=0x61eb80 [0xb8], DesiredAccess=SYNCHRONIZE|GENERIC_READ|0x80, ObjectAttributes="\??C:\Users\klosh\Desktop\OS2\tests\input.txt", IoStatusBlock=0x61eb88 [0/1], AllocationSize=null, FileAttributes=0x80, ShareAccess=0, CreateDisposition=1, CreateOptions=0x60, EaBuffer=null, EaLength=0) => 0

NtReadFile(FileHandle=0xb8, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61ece0 [0/0x4b], Buffer=0x61ed40, Length=0x1000, ByteOffset=null, Key=null) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61df40 [0/0], IoControlCode=0x00500016, InputBuffer=0x61df50, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0

Matrix size: 2 x 2

NtWriteFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e0e0 [0/0x14], Buffer=0x61e180, Length=0x14, ByteOffset=null, Key=null) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61df50 [0/0], IoControlCode=0x00500016, InputBuffer=0x61df60, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0

Multiplying matrices...

NtWriteFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e0f0 [0/0x19], Buffer=0x61e190, Length=0x19, ByteOffset=null, Key=null) => 0

Created thread: 17688 at 00000000004015EE

Created thread: 17976 at 00000000004015EE

Created thread: 12204 at 00000000004015EE

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0xd0f1b0, IoControlCode=0x00500016, InputBuffer=0xd0f1c0, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0xc00700bb [187 '?? ??????? ?????????? ??? ?????????? ??????????']

Created thread: 19088 at 00000000004015EE

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0xf0f1b0, IoControlCode=0x00500016, InputBuffer=0xf0f1c0, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0xc00700bb [187 '?? ??????? ?????????? ??? ?????????? ??????????']

Thread 12204 exit code: 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x110f1b0, IoControlCode=0x00500016, InputBuffer=0x110f1c0, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0xc00700bb [187 '?? ??????? ?????????? ??? ?????????? ??????????']

Thread 19088 exit code: 0

Thread 17976 exit code: 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0xb0f1b0, IoControlCode=0x00500016, InputBuffer=0xb0f1c0, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0xc00700bb [187 '?? ??????? ?????????? ??? ?????????? ??????????']

Thread 17688 exit code: 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61df50 [0/0], IoControlCode=0x00500016, InputBuffer=0x61df60, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0

Multiplication complete. Result matrix:

NtWriteFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e0f0 [0/0x29], Buffer=0x61e190, Length=0x29, ByteOffset=null, Key=null) => 0

(-17.00 + 53.00i) NtDeviceIoControlFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61fa50 [0/0x12], IoControlCode=0x00500016, InputBuffer=0x61fa60, InputBufferLength=0x40, OutputBuffer=null, OutputBufferLength=0) => 0

(5.00 + 45.00i) NtDeviceIoControlFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61fa50 [0/0x10], IoControlCode=0x00500016, InputBuffer=0x61fa60, InputBufferLength=0x40, OutputBuffer=null, OutputBufferLength=0) => 0

NtDeviceIoControlFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61fa50 [0/1], IoControlCode=0x00500016, InputBuffer=0x61fa60, InputBufferLength=0x40, OutputBuffer=null, OutputBufferLength=0) => 0

(-21.00 + 105.00i) NtDeviceIoControlFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61fa50 [0/0x13], IoControlCode=0x00500016, InputBuffer=0x61fa60, InputBufferLength=0x40, OutputBuffer=null, OutputBufferLength=0) => 0

(17.00 + 89.00i) NtDeviceIoControlFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61fa50 [0/0x11], IoControlCode=0x00500016, InputBuffer=0x61fa60, InputBufferLength=0x40, OutputBuffer=null, OutputBufferLength=0) => 0

NtDeviceIoControlFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61fa50 [0/1], IoControlCode=0x00500016, InputBuffer=0x61fa60, InputBufferLength=0x40, OutputBuffer=null, OutputBufferLength=0) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61df40 [0/0], IoControlCode=0x00500016, InputBuffer=0x61df50, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0

Time taken: 0.018656 seconds

NtWriteFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e0e0 [0/0x1e], Buffer=0x61e180, Length=0x1e, ByteOffset=null, Key=null) => 0

NtDeviceIoControlFile(FileHandle=0x60, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61df50 [0/0], IoControlCode=0x00500016, InputBuffer=0x61df60, InputBufferLength=0x30, OutputBuffer=null, OutputBufferLength=0) => 0

Memory freed, program complete.

NtWriteFile(FileHandle=0x150, Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x61e0f0 [0/0x21], Buffer=0x61e190, Length=0x21, ByteOffset=null, Key=null) => 0

NtTerminateProcess(ProcessHandle=0, ExitStatus=0) => 0

Process 12016 exit code: 0

Лабораторная работа №3.

C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main>NtTrace -filter

NtCreateSection,NtMapViewOfSection,NtUnmapViewOfSection,NtOpenFile

C:\Users\klosh\Desktop\OS3\build\parent.exe C:\Users\klosh\Desktop\OS3\test\test.txt

Process 11108 starting at 00000000004014E0 with command line:

"C:\Users\klosh\Desktop\OS3\build\parent.exe C:\Users\klosh\Desktop\OS3\test\test.txt"

C:\Users\klosh\Desktop\OS3\build\parent.exe

Loaded DLL at 00007FFD423F0000 ntdll.dll

NtOpenFile(FileHandle=0x61f398 [0x54], DesiredAccess=SYNCHRONIZE|0x20,

ObjectAttributes="\??\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\",

IoStatusBlock=0x61f308 [0/1],

ShareAccess=3, OpenOptions=0x21) => 0

Loaded DLL at 00007FFD40C40000 C:\WINDOWS\System32\KERNEL32.DLL

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1, BaseAddress=0x674b80
[0x00007ffd40c40000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x674ad8 [0x000c4000],

InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Loaded DLL at 00007FFD3F6F0000 C:\WINDOWS\System32\KERNELBASE.dll

NtMapViewOfSection(SectionHandle=0x68, ProcessHandle=-1, BaseAddress=0x6752c0
[0x00007ffd3f6f0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x675218 [0x003b9000],

InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtCreateSection(SectionHandle=0x61e900 [0x6c],

DesiredAccess=DELETE|READ_CONTROL|WRITE_DAC|WRITE_OWNER|0x1f,

ObjectAttributes=null,

SectionSize=0x61e8f0 [65536], Protect=4, Attributes=0x08000000, FileHandle=0) => 0

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1, BaseAddress=0x61e8f8
[0x00007ffd4fdec0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e908 [0x00100000],

InheritDisposition=2

[ViewUnmap], AllocationType=0x00500000, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x98, ProcessHandle=-1, BaseAddress=0x61e890
[0x001d0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e8a0 [0x3000],
InheritDisposition=2

[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x9c, ProcessHandle=-1, BaseAddress=0x61e890
[0x001e0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e8a0 [0x3000],
InheritDisposition=2

[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0xa0, ProcessHandle=-1, BaseAddress=0x61e890
[0x001f0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e8a0 [0x1000],
InheritDisposition=2

[ViewUnmap], AllocationType=0, Protect=2) => 0

Loaded DLL at 00007FFD409C0000 C:\WINDOWS\System32\msvcrt.dll

NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1, BaseAddress=0x677f30
[0x00007ffd409c0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x675078 [0x000a7000],
InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Initial breakpoint

NtCreateSection(SectionHandle=0x61fb40 [0xbc],

DesiredAccess=DELETE|READ_CONTROL|WRITE_DAC|WRITE_OWNER[0x7,

ObjectAttributes=0x80:"Local\SharedMemoryExample", SectionSize=0x61fb30 [256], Protect=4,

Attributes=0x08000000, FileHandle=0) => 0

NtCreateSection используется для создания секции, которая может быть сопоставлена с
памятью

процесса. Первый вызов, который создает секцию для общей памяти

NtMapViewOfSection(SectionHandle=0xbc, ProcessHandle=-1, BaseAddress=0x61fb98
[0x00620000],

ZeroBits=0, CommitSize=0, SectionOffset=0x61fb90 [0], ViewSize=0x61fba0 [0x1000],
InheritDisposition=1

[ViewShare], AllocationType=0, Protect=4) => 0

В Windows аналог mmap — это NtMapViewOfSection. Этот вызов используется для
сопоставления

представления секции с адресным пространством процесса.

Loaded DLL at 00007FFD41E90000 C:\WINDOWS\System32\sechost.dll

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1, BaseAddress=0x679000 [0x00007ffd41e90000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x675078 [0x000a7000],
InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Loaded DLL at 00007FFD3FAB0000 C:\WINDOWS\System32\bcrypt.dll

NtMapViewOfSection(SectionHandle=0xc4, ProcessHandle=-1, BaseAddress=0x679490 [0x00007ffd3fab0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x6793f8 [0x00028000],
InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtOpenFile(FileHandle=0x7ffd3fad27a0 [0xd4], DesiredAccess=SYNCHRONIZE|0x3,

ObjectAttributes="\Device\KsecDD", IoStatusBlock=0x61cf10 [0/0], ShareAccess=7,
OpenOptions=0x20) => 0

Process 18948 starting at 00000000004014E0 with command line: "child.exe"

C:\Users\klosh\Desktop\OS3\build\child.exe

Loaded DLL at 00007FFD423F0000 ntdll.dll

NtOpenFile(FileHandle=0x61f398 [0x5c], DesiredAccess=SYNCHRONIZE|0x20,

ObjectAttributes="\\?\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\
IoStatusBlock=0x61f308 [0/1],

ShareAccess=3, OpenOptions=0x21) => 0

Loaded DLL at 00007FFD40C40000 C:\WINDOWS\System32\KERNEL32.DLL

NtMapViewOfSection(SectionHandle=0x60, ProcessHandle=-1, BaseAddress=0x744af0 [0x00007ffd40c40000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x744a48 [0x000c4000],
InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Loaded DLL at 00007FFD3F6F0000 C:\WINDOWS\System32\KERNELBASE.dll

NtMapViewOfSection(SectionHandle=0x64, ProcessHandle=-1, BaseAddress=0x745230 [0x00007ffd3f6f0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x745188 [0x003b9000],
InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtCreateSection(SectionHandle=0x61e900 [0x64],

DesiredAccess=DELETE|READ_CONTROL|WRITE_DAC|WRITE_OWNER|0x1f,
ObjectAttributes=null,

SectionSize=0x61e8f0 [65536], Protect=4, Attributes=0x08000000, FileHandle=0) => 0

NtMapViewOfSection(SectionHandle=0x60, ProcessHandle=-1, BaseAddress=0x61e8f8 [0x00007ff4fdec0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e908 [0x00100000],
InheritDisposition=2

[ViewUnmap], AllocationType=0x00500000, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x94, ProcessHandle=-1, BaseAddress=0x61e890 [0x001d0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e8a0 [0x3000],
InheritDisposition=2

[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x98, ProcessHandle=-1, BaseAddress=0x61e890 [0x001e0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e8a0 [0x3000],
InheritDisposition=2

[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x9c, ProcessHandle=-1, BaseAddress=0x61e890 [0x001f0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x61e8a0 [0x1000],
InheritDisposition=2

[ViewUnmap], AllocationType=0, Protect=2) => 0

Loaded DLL at 00007FFD409C0000 C:\WINDOWS\System32\msvcrt.dll

NtMapViewOfSection(SectionHandle=0xb4, ProcessHandle=-1, BaseAddress=0x747e50 [0x00007ffd409c0000],

ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x744fe8 [0x000a7000],
InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Initial breakpoint

NtMapViewOfSection(SectionHandle=0x60, ProcessHandle=-1, BaseAddress=0x61fa18 [0x00620000],

ZeroBits=0, CommitSize=0, SectionOffset=0x61fa10 [0], ViewSize=0x61fa20 [0x1000],
InheritDisposition=1

[ViewShare], AllocationType=0, Protect=4) => 0

Этот вызов отображает ту же секцию в адресное пространство дочернего процесса

NtUnmapViewOfSectionEx(ProcessHandle=-1, BaseAddress=0x620000, Flags=0) => 0

Process 18948 exit code: 0

дочерний процесс удаляет отображение секции из своего адресного пространства

Result from child process: Sum: 53.20

NtUnmapViewOfSectionEx(ProcessHandle=-1, BaseAddress=0x620000, Flags=0) => 0

Process 11108 exit code: 0

Лабораторная работа №4.

Program1

PS C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main> .\NtTrace -v -pre -filter
NtMapViewOfSection,NtUnmapViewOfSection,NtOpenFile,NtCreateFile,NtReadFi

le

C:\Users\klosh\Desktop\OS4\TestProgram1.exe

Process 2704 starting at 00007FF60E3613F0 with command line:

"C:\Users\klosh\Desktop\OS4\TestProgram1.exe"

C:\Users\klosh\Desktop\OS4\TestProgram1.exe

Loaded DLL at 00007FF9624F0000 ntdll.dll

Instrumenting NtCreateFile at: 00007FF962590C60, ssn: 0x55

Instrumenting NtOpenFile at: 00007FF962590820, ssn: 0x33

Instrumenting NtReadFile at: 00007FF962590280, ssn: 0x6

Instrumenting NtReadFileScatter at: 00007FF962590780, ssn: 0x2e

Instrumenting NtMapViewOfSection at: 00007FF9625906C0, ssn: 0x28

Instrumenting NtMapViewOfSectionEx at: 00007FF962592530, ssn: 0x11c

Instrumenting NtUnmapViewOfSection at: 00007FF962590700, ssn: 0x2a

Instrumenting NtUnmapViewOfSectionEx at: 00007FF962593D30, ssn: 0x1dc

NtOpenFile(FileHandle=0x82751ff378, DesiredAccess=SYNCHRONIZE|0x20,

ObjectAttributes="\??\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\",

IoStatusBlock=0x82751ff2e8, ShareAccess=3, OpenOptions=0x21) ...

NtOpenFile(FileHandle=0x82751ff378 [0x54],

DesiredAccess=SYNCHRONIZE|0x20,

ObjectAttributes="\??\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\",

IoStatusBlock=0x82751ff2e8 [0/1], ShareAccess=3, OpenOptions=0x21) => 0

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,

BaseAddress=0x22debc149f0 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,

ViewSize=0x22debc14948 [0], InheritDisposition=1 [ViewShare],

AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF9618F0000 C:\WINDOWS\System32\KERNEL32.DLL

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,
BaseAddress=0x22debc149f0 [0x00007ff9618f0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc14948 [0x000c4000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtMapViewOfSection(SectionHandle=0x68, ProcessHandle=-1,
BaseAddress=0x22debc15130 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x22debc15088 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF95FBE0000 C:\WINDOWS\System32\KERNELBASE.dll

NtMapViewOfSection(SectionHandle=0x68, ProcessHandle=-1,
BaseAddress=0x22debc15130 [0x00007ff95fbe0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc15088 [0x003b9000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,
BaseAddress=0x82751fe8d8 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x82751fe8e8 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0x00500000, Protect=2) ...

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,
BaseAddress=0x82751fe8d8 [0x00007ff448ca0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x82751fe8e8 [0x00100000], InheritDisposition=2
[ViewUnmap], AllocationType=0x00500000, Protect=2) => 0

NtCreateFile(FileHandle=0x82751feb08,
DesiredAccess=READ_CONTROL|SYNCHRONIZE|0x19f,
ObjectAttributes=4:"\Connect", IoStatusBlock=0x82751fe4c0, AllocationSize=null,
FileAttributes=0, ShareAccess=7, CreateDisposition=2, CreateOptions=0x20,
EaBuffer=0x22debc165d0, EaLength=0x54b) ...

NtCreateFile(FileHandle=0x82751feb08 [0x58],
DesiredAccess=READ_CONTROL|SYNCHRONIZE|0x19f,
ObjectAttributes=4:"\Connect", IoStatusBlock=0x82751fe4c0 [0/0x18],

AllocationSize=null, FileAttributes=0, ShareAccess=7, CreateDisposition=2,
CreateOptions=0x20, EaBuffer=0x22debc165d0, EaLength=0x54b) => 0
NtMapViewOfSection(SectionHandle=0x94, ProcessHandle=-1,
BaseAddress=0x82751fe870 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x82751fe880 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0,
Protect=2) ...

NtMapViewOfSection(SectionHandle=0x94, ProcessHandle=-1,
BaseAddress=0x82751fe870 [0x0000022debde0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x82751fe880 [0x3000], InheritDisposition=2
[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x98, ProcessHandle=-1,
BaseAddress=0x82751fe870 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x82751fe880 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0,
Protect=2) ...

NtMapViewOfSection(SectionHandle=0x98, ProcessHandle=-1,
BaseAddress=0x82751fe870 [0x0000022debdf0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x82751fe880 [0x3000], InheritDisposition=2
[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x9c, ProcessHandle=-1,
BaseAddress=0x82751fe870 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x82751fe880 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0,
Protect=2) ...

NtMapViewOfSection(SectionHandle=0x9c, ProcessHandle=-1,
BaseAddress=0x82751fe870 [0x0000022debe00000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x82751fe880 [0x1000], InheritDisposition=2
[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0xb4, ProcessHandle=-1,
BaseAddress=0x22debc14da0 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,

ViewSize=0x22debc14cd8 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...
Loaded DLL at 00007FF95FFA0000 C:\WINDOWS\System32\ucrtbase.dll
NtMapViewOfSection(SectionHandle=0xb4, ProcessHandle=-1,
BaseAddress=0x22debc14da0 [0x00007ff95ffa0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc14cd8 [0x00111000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0
NtOpenFile(FileHandle=0x82751fef0, DesiredAccess=SYNCHRONIZE|0x21,
ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Euclid.dll",
IoStatusBlock=0x82751ff048, ShareAccess=5, OpenOptions=0x60) ...
NtOpenFile(FileHandle=0x82751fef0 [0x68],
DesiredAccess=SYNCHRONIZE|0x21,
ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Euclid.dll",
IoStatusBlock=0x82751ff048 [0/1], ShareAccess=5, OpenOptions=0x60) => 0
NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,
BaseAddress=0x22debc18220 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x22debc18178 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...
Loaded DLL at 00007FF93DC00000
C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Euclid.dll
NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,
BaseAddress=0x22debc18220 [0x00007ff93dc00000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc18178 [0x00015000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0
NtOpenFile(FileHandle=0x82751fef0, DesiredAccess=SYNCHRONIZE|0x21,
ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libPi_Leibniz.dll",
IoStatusBlock=0x82751ff048, ShareAccess=5, OpenOptions=0x60) ...
NtOpenFile(FileHandle=0x82751fef0 [0x68],
DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="\??\C:\Users\klosh\Desktop\OS4\libPi_Leibniz.dll",
IoStatusBlock=0x82751ff048 [0/1], ShareAccess=5, OpenOptions=0x60) => 0
NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,
BaseAddress=0x22debc18530 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x22debc18488 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF93BF20000 C:\Users\klosh\Desktop\OS4\libPi_Leibniz.dll
NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,
BaseAddress=0x22debc18530 [0x00007ff93bf20000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc18488 [0x00015000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Initial breakpoint

Enter the command (1 for GCF, 2 for Pi, 3 to exit): NtReadFile(FileHandle=0x5c,
Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x82751ff980,
Buffer=0x22debc1efe0, Length=0x1000, ByteOffset=null, Key=null) ...

1

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x82751ff980 [0/3], Buffer=0x22debc1efe0, Length=0x1000,
ByteOffset=null, Key=null) => 0

Enter two numbers: NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null,
ApcContext=null, IoStatusBlock=0x82751ff980, Buffer=0x22debc1efe0,
Length=0x1000, ByteOffset=null, Key=null) ...

16 24

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x82751ff980 [0/7], Buffer=0x22debc1efe0, Length=0x1000,
ByteOffset=null, Key=null) => 0

GCF (Euclid): 8

Enter the command (1 for GCF, 2 for Pi, 3 to exit): NtReadFile(FileHandle=0x5c,
Event=0, ApcRoutine=null, ApcContext=null, IoStatusBlock=0x82751ff980,

Buffer=0x22debc1efe0, Length=0x1000, ByteOffset=null, Key=null) ...

3

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x82751ff980 [0/3], Buffer=0x22debc1efe0, Length=0x1000,
ByteOffset=null, Key=null) => 0

NtOpenFile(FileHandle=0x82751ff710, DesiredAccess=SYNCHRONIZE|0x21,
ObjectAttributes="\??\C:\WINDOWS\SYSTEM32\kernel.appcore.dll",
IoStatusBlock=0x82751ff778, ShareAccess=5, OpenOptions=0x60) ...

NtOpenFile(FileHandle=0x82751ff710 [0xb8],
DesiredAccess=SYNCHRONIZE|0x21,
ObjectAttributes="\??\C:\WINDOWS\SYSTEM32\kernel.appcore.dll",
IoStatusBlock=0x82751ff778 [0/1], ShareAccess=5, OpenOptions=0x60) => 0

NtMapViewOfSection(SectionHandle=0xbc, ProcessHandle=-1,
BaseAddress=0x22debc20190 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x22debc200b8 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF95E8E0000 C:\WINDOWS\SYSTEM32\kernel.appcore.dll

NtMapViewOfSection(SectionHandle=0xbc, ProcessHandle=-1,
BaseAddress=0x22debc20190 [0x00007ff95e8e0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc200b8 [0x00018000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,
BaseAddress=0x22debc20410 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x22debc20378 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF960210000 C:\WINDOWS\System32\msvcrt.dll

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,
BaseAddress=0x22debc20410 [0x00007ff960210000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x22debc20378 [0x000a7000], InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Process 2704 exit code: 0

Program2

C:\Users\klosh\Desktop\OS4\TestProgram2.exe

Loaded DLL at 00007FF9624F0000 ntdll.dll

Instrumenting NtCreateFile at: 00007FF962590C60, ssn: 0x55

Instrumenting NtOpenFile at: 00007FF962590820, ssn: 0x33

Instrumenting NtReadFile at: 00007FF962590280, ssn: 0x6

Instrumenting NtReadFileScatter at: 00007FF962590780, ssn: 0x2e

Instrumenting NtMapViewOfSection at: 00007FF9625906C0, ssn: 0x28

Instrumenting NtMapViewOfSectionEx at: 00007FF962592530, ssn: 0x11c

Instrumenting NtUnmapViewOfSection at: 00007FF962590700, ssn: 0x2a

Instrumenting NtUnmapViewOfSectionEx at: 00007FF962593D30, ssn: 0x1dc

NtOpenFile(FileHandle=0x2841bff188, DesiredAccess=SYNCHRONIZE|0x20,

ObjectAttributes="??\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\",

IoStatusBlock=0x2841bff0f8, ShareAccess=3, OpenOptions=0x21) ...

NtOpenFile(FileHandle=0x2841bff188 [0x54],

DesiredAccess=SYNCHRONIZE|0x20,

ObjectAttributes="??\C:\Users\klosh\Desktop\NtTrace-main\NtTrace-main\",

IoStatusBlock=0x2841bff0f8 [0/1], ShareAccess=3, OpenOptions=0x21) => 0

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,

BaseAddress=0x208d16b49f0 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,

ViewSize=0x208d16b4948 [0], InheritDisposition=1 [ViewShare],

AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF9618F0000 C:\WINDOWS\System32\KERNEL32.DLL

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,

BaseAddress=0x208d16b49f0 [0x00007ff9618f0000], ZeroBits=0, CommitSize=0,

SectionOffset=null, ViewSize=0x208d16b4948 [0x000c4000], InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtMapViewOfSection(SectionHandle=0x68, ProcessHandle=-1,

BaseAddress=0x208d16b5130 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x208d16b5088 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF95FBE0000 C:\WINDOWS\System32\KERNELBASE.dll

NtMapViewOfSection(SectionHandle=0x68, ProcessHandle=-1,
BaseAddress=0x208d16b5130 [0x00007ff95fbe0000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x208d16b5088 [0x003b9000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,
BaseAddress=0x2841bfe6e8 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x2841bfe6f8 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0x00500000, Protect=2) ...

NtMapViewOfSection(SectionHandle=0x58, ProcessHandle=-1,
BaseAddress=0x2841bfe6e8 [0x00007ff48ed60000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x2841bfe6f8 [0x00100000], InheritDisposition=2
[ViewUnmap], AllocationType=0x00500000, Protect=2) => 0

NtCreateFile(FileHandle=0x2841bfe918,
DesiredAccess=READ_CONTROL|SYNCHRONIZE|0x19f,
ObjectAttributes=4:"\Connect", IoStatusBlock=0x2841bfe2d0, AllocationSize=null,
FileAttributes=0, ShareAccess=7, CreateDisposition=2, CreateOptions=0x20,
EaBuffer=0x208d16b65d0, EaLength=0x54b) ...

NtCreateFile(FileHandle=0x2841bfe918 [0x58],
DesiredAccess=READ_CONTROL|SYNCHRONIZE|0x19f,
ObjectAttributes=4:"\Connect", IoStatusBlock=0x2841bfe2d0 [0/0x18],
AllocationSize=null, FileAttributes=0, ShareAccess=7, CreateDisposition=2,
CreateOptions=0x20, EaBuffer=0x208d16b65d0, EaLength=0x54b) => 0

NtMapViewOfSection(SectionHandle=0x90, ProcessHandle=-1,
BaseAddress=0x2841bfe680 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x2841bfe690 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0,

Protect=2) ...

NtMapViewOfSection(SectionHandle=0x90, ProcessHandle=-1,
BaseAddress=0x2841bfe680 [0x00000208d1640000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x2841bfe690 [0x3000], InheritDisposition=2
[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x94, ProcessHandle=-1,
BaseAddress=0x2841bfe680 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x2841bfe690 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0,

Protect=2) ...

NtMapViewOfSection(SectionHandle=0x94, ProcessHandle=-1,
BaseAddress=0x2841bfe680 [0x00000208d1650000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x2841bfe690 [0x3000], InheritDisposition=2
[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0x98, ProcessHandle=-1,
BaseAddress=0x2841bfe680 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x2841bfe690 [0], InheritDisposition=2 [ViewUnmap],
AllocationType=0,

Protect=2) ...

NtMapViewOfSection(SectionHandle=0x98, ProcessHandle=-1,
BaseAddress=0x2841bfe680 [0x00000208d1660000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x2841bfe690 [0x1000], InheritDisposition=2
[ViewUnmap], AllocationType=0, Protect=2) => 0

NtMapViewOfSection(SectionHandle=0xb0, ProcessHandle=-1,
BaseAddress=0x208d16b4da0 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x208d16b4cd8 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF95FFA0000 C:\WINDOWS\System32\ucrtbase.dll

NtMapViewOfSection(SectionHandle=0xb0, ProcessHandle=-1,
BaseAddress=0x208d16b4da0 [0x00007ff95ffa0000], ZeroBits=0, CommitSize=0,

SectionOffset=null, ViewSize=0x208d16b4cd8 [0x00111000], InheritDisposition=1 [ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Initial breakpoint

NtOpenFile(FileHandle=0x2841bff430, DesiredAccess=SYNCHRONIZE|0x21, ObjectAttributes="\\?\\C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Euclid.dll", IoStatusBlock=0x2841bff498, ShareAccess=5, OpenOptions=0x60) ...

NtOpenFile(FileHandle=0x2841bff430 [0xb8], DesiredAccess=SYNCHRONIZE|0x21, ObjectAttributes="\\?\\C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Euclid.dll", IoStatusBlock=0x2841bff498 [0/1], ShareAccess=5, OpenOptions=0x60) => 0

NtMapViewOfSection(SectionHandle=0xbc, ProcessHandle=-1, BaseAddress=0x208d16bcfd0 [0], ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x208d16bbe98 [0], InheritDisposition=1 [ViewShare], AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF93AC40000

C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Euclid.dll

NtMapViewOfSection(SectionHandle=0xbc, ProcessHandle=-1, BaseAddress=0x208d16bcfd0 [0x00007ff93ac40000], ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x208d16bbe98 [0x00015000], InheritDisposition=1 [ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtOpenFile(FileHandle=0x2841bff430, DesiredAccess=SYNCHRONIZE|0x21, ObjectAttributes="\\?\\C:\\Users\\klosh\\Desktop\\OS4\\libPi_Leibniz.dll", IoStatusBlock=0x2841bff498, ShareAccess=5, OpenOptions=0x60) ...

NtOpenFile(FileHandle=0x2841bff430 [0xc0], DesiredAccess=SYNCHRONIZE|0x21, ObjectAttributes="\\?\\C:\\Users\\klosh\\Desktop\\OS4\\libPi_Leibniz.dll", IoStatusBlock=0x2841bff498 [0/1], ShareAccess=5, OpenOptions=0x60) => 0

NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1, BaseAddress=0x208d16bd270 [0], ZeroBits=0, CommitSize=0, SectionOffset=null, ViewSize=0x208d16bbe98 [0], InheritDisposition=1 [ViewShare], AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF939380000 C:\Users\klosh\Desktop\OS4\libPi_Leibniz.dll

NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,
BaseAddress=0x208d16bd270 [0x00007ff939380000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x208d16bbe98 [0x00015000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Enter the command (0 to switch libraries, 1 for GCF, 2 for Pi, 3 to exit):

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770, Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null,
Key=null) ...

1

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770 [0/3], Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null, Key=null) => 0

Enter two numbers: NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null,
ApcContext=null, IoStatusBlock=0x2841bff770, Buffer=0x208d16befc0,
Length=0x1000, ByteOffset=null, Key=null) ...

6 9

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770 [0/5], Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null, Key=null) => 0

GCF: 3

Enter the command (0 to switch libraries, 1 for GCF, 2 for Pi, 3 to exit):

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770, Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null,
Key=null) ...

0

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770 [0/3], Buffer=0x208d16befc0, Length=0x1000,

ByteOffset=null, Key=null) => 0

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff93ac40000) ...

Unload of DLL at 00007FF93AC40000

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff93ac40000) => 0

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff939380000) ...

Unload of DLL at 00007FF939380000

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff939380000) => 0

NtOpenFile(FileHandle=0x2841bff470, DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Naive.dll",

IoStatusBlock=0x2841bff4d8, ShareAccess=5, OpenOptions=0x60) ...

NtOpenFile(FileHandle=0x2841bff470 [0xc4],

DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Naive.dll",

IoStatusBlock=0x2841bff4d8 [0/1], ShareAccess=5, OpenOptions=0x60) => 0

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,

BaseAddress=0x208d16c1a50 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,

ViewSize=0x208d16bbe98 [0], InheritDisposition=1 [ViewShare],

AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF93BF20000 C:\\Users\\klosh\\Desktop\\OS4\\libGCF_Naive.dll

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,

BaseAddress=0x208d16c1a50 [0x00007ff93bf20000], ZeroBits=0, CommitSize=0,

SectionOffset=null, ViewSize=0x208d16bbe98 [0x00015000], InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtOpenFile(FileHandle=0x2841bff470, DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libPi_Wallis.dll",

IoStatusBlock=0x2841bff4d8, ShareAccess=5, OpenOptions=0x60) ...

NtOpenFile(FileHandle=0x2841bff470 [0xc4],

DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="?\\C:\\Users\\klosh\\Desktop\\OS4\\libPi_Wallis.dll",

IoStatusBlock=0x2841bff4d8 [0/1], ShareAccess=5, OpenOptions=0x60) => 0

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,
BaseAddress=0x208d16c1d40 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x208d16bbe98 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF93BA20000 C:\Users\klosh\Desktop\OS4\libPi_Wallis.dll

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,
BaseAddress=0x208d16c1d40 [0x00007ff93ba20000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x208d16bbe98 [0x00015000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Switched to another library.

Enter the command (0 to switch libraries, 1 for GCF, 2 for Pi, 3 to exit):

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770, Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null,
Key=null) ...

1

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770 [0/3], Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null, Key=null) => 0

Enter two numbers: NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null,
ApcContext=null, IoStatusBlock=0x2841bff770, Buffer=0x208d16befc0,
Length=0x1000, ByteOffset=null, Key=null) ...

6 9

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770 [0/5], Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null, Key=null) => 0

GCF: 3

Enter the command (0 to switch libraries, 1 for GCF, 2 for Pi, 3 to exit):

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,

IoStatusBlock=0x2841bff770, Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null,
Key=null) ...

3

NtReadFile(FileHandle=0x5c, Event=0, ApcRoutine=null, ApcContext=null,
IoStatusBlock=0x2841bff770 [0/3], Buffer=0x208d16befc0, Length=0x1000,
ByteOffset=null, Key=null) => 0

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff93bf20000) ...

Unload of DLL at 00007FF93BF20000

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff93bf20000) => 0

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff93ba20000) ...

Unload of DLL at 00007FF93BA20000

NtUnmapViewOfSection(ProcessHandle=-1, BaseAddress=0x7ff93ba20000) => 0

NtOpenFile(FileHandle=0x2841bff520, DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="?\\C:\\WINDOWS\\SYSTEM32\\kernel.appcore.dll",

IoStatusBlock=0x2841bff588, ShareAccess=5, OpenOptions=0x60) ...

NtOpenFile(FileHandle=0x2841bff520 [0xc4],
DesiredAccess=SYNCHRONIZE|0x21,

ObjectAttributes="?\\C:\\WINDOWS\\SYSTEM32\\kernel.appcore.dll",

IoStatusBlock=0x2841bff588 [0/1], ShareAccess=5, OpenOptions=0x60) => 0

NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,

BaseAddress=0x208d16bbcf0 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,

ViewSize=0x208d16c1ac8 [0], InheritDisposition=1 [ViewShare],

AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF95E8E0000 C:\\WINDOWS\\SYSTEM32\\kernel.appcore.dll

NtMapViewOfSection(SectionHandle=0xb8, ProcessHandle=-1,

BaseAddress=0x208d16bbcf0 [0x00007ff95e8e0000], ZeroBits=0, CommitSize=0,

SectionOffset=null, ViewSize=0x208d16c1ac8 [0x00018000], InheritDisposition=1

[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,

BaseAddress=0x208d16c1d20 [0], ZeroBits=0, CommitSize=0, SectionOffset=null,
ViewSize=0x208d16c1c88 [0], InheritDisposition=1 [ViewShare],
AllocationType=0x00800000, Protect=0x80) ...

Loaded DLL at 00007FF960210000 C:\WINDOWS\System32\msvcrt.dll

NtMapViewOfSection(SectionHandle=0xc0, ProcessHandle=-1,
BaseAddress=0x208d16c1d20 [0x00007ff960210000], ZeroBits=0, CommitSize=0,
SectionOffset=null, ViewSize=0x208d16c1c88 [0x000a7000], InheritDisposition=1
[ViewShare], AllocationType=0x00800000, Protect=0x80) => 0

Process 18472 exit code: 0

Лабораторная работа №5-7.

73024 read(3, "\\177ELF\\2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73024 read(3, "\\177ELF\\2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73024 read(3, "\\177ELF\\2\\1\\1\\0\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73024 read(3, "\\177ELF\\2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0P\\237\\2\\0\\0\\0\\0\\0"..., 832) = 832

73024 read(3, "\\177ELF\\2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

[illegible]

```

73024 read(0, 0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)
73024 --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---
73024 read(0, "create 10 -1\n", 1024) = 13
73024 socket(AF_NETLINK, SOCK_RAW|SOCK_CLOEXEC, NETLINK_ROUTE) = 10
73024 bind(10, {sa_family=AF_NETLINK, nl_pid=0, nl_groups=00000000}, 12) = 0
73024 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 10
73024 bind(10, {sa_family=AF_INET, sin_port=htons(4050), sin_addr=inet_addr("127.0.0.1")}, 16) = 0
73024 write(6, "\1\0\0\0\0\0\0", 8) = 8
73024 write(9, "\1\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0", 8) = 8
73102 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73102 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73102 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73102 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0"..., 832) = 832
73102 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73102 write(6, "\1\0\0\0\0\0\0", 8) = 8
73102 write(8, "\1\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0", 8) = 8
73102 read(8, "\1\0\0\0\0\0\0", 8) = 8
73105 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9
73105 connect(9, {sa_family=AF_INET, sin_port=htons(4050), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)
73026 write(6, "\1\0\0\0\0\0\0", 8) = 8
73105 write(6, "\1\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0", 8) = 8
73105 write(8, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73026 write(9, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73105 <... write resumed> = 8

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73026 <... write resumed>          = 8

73102 read(8, <unfinished ...>

73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73102 <... read resumed>"\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73024 write(1, "Ok: 73102\\n", 10)    = 10

73024 read(0, <unfinished ...>

73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73024 <... read resumed>"create 20 10\\n", 1024) = 13

73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8

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73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73102 socket(AF_NETLINK, SOCK_RAW|SOCK_CLOEXEC, NETLINK_ROUTE) = 11

73102 bind(11, {sa_family=AF_NETLINK, nl_pid=0, nl_groups=00000000}, 12) = 0

73102 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 11

73102 bind(11, {sa_family=AF_INET, sin_port=htons(4060), sin_addr=inet_addr("127.0.0.1")}, 16) = 0

73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73102 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73102 read(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73202 read(3, "\\177ELF2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73202 read(3, "\\177ELF2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73202 read(3, "\\177ELF2\\1\\1\\0\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73202 read(3, "\\177ELF2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0P\\237\\2\\0\\0\\0\\0\\0"..., 832) = 832

73202 read(3, "\\177ELF2\\1\\1\\3\\0\\0\\0\\0\\0\\0\\0\\3\\0>\\0\\1\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0\\0"..., 832) = 832

73202 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73202 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73202 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73204 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73204 connect(9, {sa_family=AF_INET, sin_port=htons(4060), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73105 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73204 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73105 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

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73102 read(10, "\1\0\0\0\0\0\0", 8) = 8
73204 write(8, "\1\0\0\0\0\0\0", 8) = 8
73202 read(8, "\1\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73202 write(6, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73102 <... write resumed>) = 8
73202 <... write resumed>) = 8
73204 read(6, "\1\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0", 8) = 8
73105 write(10, "\1\0\0\0\0\0\0", 8) = 8
73102 read(10, "\1\0\0\0\0\0\0", 8) = 8
73204 write(8, "\1\0\0\0\0\0\0", 8) = 8
73202 read(8, "\1\0\0\0\0\0\0", 8) = 8
73202 write(6, "\1\0\0\0\0\0\0", 8) = 8
73204 read(6, "\1\0\0\0\0\0\0", 8) = 8
73204 write(8, "\1\0\0\0\0\0\0", 8) = 8
73202 read(8, "\1\0\0\0\0\0\0", 8) = 8
73105 write(10, "\1\0\0\0\0\0\0", 8) = 8
73102 read(10, "\1\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0", 8) = 8
73024 write(1, "Ok: 73202\n", 10) = 10
73024 read(0, "create 30 10\n", 1024) = 13
73024 write(6, "\1\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0", 8) = 8
73105 write(8, "\1\0\0\0\0\0\0", 8) = 8
73102 read(8, "\1\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0", 8) = 8

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73105 read(6, "\1\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0", 8) = 8
73024 write(6, "\1\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0", 8) = 8
73105 write(8, "\1\0\0\0\0\0\0", 8) = 8
73102 read(8, "\1\0\0\0\0\0\0", 8) = 8
73102 socket(AF_NETLINK, SOCK_RAW|SOCK_CLOEXEC, NETLINK_ROUTE) = 14
73102 bind(14, {sa_family=AF_NETLINK, nl_pid=0, nl_groups=00000000}, 12) = 0
73102 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 14
73102 bind(14, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = 0
73102 write(6, "\1\0\0\0\0\0\0", 8) = 8
73102 write(13, "\1\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0", 8) = 8
73102 read(13, "\1\0\0\0\0\0\0", 8) = 8
73235 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73235 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73235 read(3, "\177ELF2\1\1\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73235 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0\0"..., 832) = 832
73235 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73235 write(6, "\1\0\0\0\0\0\0", 8) = 8
73235 write(8, "\1\0\0\0\0\0\0", 8) = 8
73237 read(6, "\1\0\0\0\0\0\0", 8) = 8
73235 read(8, <unfinished ...>
73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP <unfinished ...>
73235 <... read resumed> "\1\0\0\0\0\0\0", 8) = 8
73237 <... socket resumed> = 9
73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)
73105 write(6, "\1\0\0\0\0\0\0", 8) = 8

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73237 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 read(8, <unfinished ...>
73105 write(13, "\1\0\0\0\0\0\0\0", 8 <unfinished ...>
73235 <... read resumed> "\1\0\0\0\0\0\0\0", 8) = 8
73105 <... write resumed>) = 8
73235 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(13, "\1\0\0\0\0\0\0\0", 8) = 8
73237 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 write(13, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(13, <unfinished ...>
73237 write(8, "\1\0\0\0\0\0\0\0", 8 <unfinished ...>
73102 <... read resumed> "\1\0\0\0\0\0\0\0", 8) = 8
73237 <... write resumed>) = 8
73235 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
73105 write(13, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(13, "\1\0\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 write(1, "Ok: 73235\n", 10) = 10

73024 read(0, "create 40 20\n", 1024) = 13

73024 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73026 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73102 read(8, "\1\0\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73026 write(9, "\1\0\0\0\0\0\0\0", 8) = 8

73024 read(9, "\1\0\0\0\0\0\0\0", 8) = 8

73024 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73026 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73102 read(8, "\1\0\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73204 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73202 read(8, "\1\0\0\0\0\0\0\0", 8) = 8

73202 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73204 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 write(10, "\1\0\0\0\0\0\0\0", 8) = 8

73102 read(10, "\1\0\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73204 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73202 read(8, "\1\0\0\0\0\0\0\0", 8) = 8

73202 socket(AF_NETLINK, SOCK_RAW|SOCK_CLOEXEC, NETLINK_ROUTE) = 11

73202 bind(11, {sa_family=AF_NETLINK, nl_pid=0, nl_groups=00000000}, 12) = 0

73202 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 11

73202 bind(11, {sa_family=AF_INET, sin_port=htons(4080), sin_addr=inet_addr("127.0.0.1")}, 16) = 0

73202 write(6, "\1\0\0\0\0\0\0\0", 8) = 8


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73202 write(10, "\1\0\0\0\0\0\0", 8) = 8
73204 read(6, "\1\0\0\0\0\0\0", 8) = 8
73202 read(10, "\1\0\0\0\0\0\0", 8) = 8
73268 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73268 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73268 read(3, "\177ELF2\1\1\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73268 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0\0"..., 832) = 832
73268 read(3, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
73268 write(6, "\1\0\0\0\0\0\0", 8) = 8
73268 write(8, "\1\0\0\0\0\0\0", 8) = 8
73270 read(6, "\1\0\0\0\0\0\0", 8) = 8
73268 read(8, "\1\0\0\0\0\0\0", 8) = 8
73270 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9
73270 connect(9, {sa_family=AF_INET, sin_port=htons(4080), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)
73204 write(6, "\1\0\0\0\0\0\0", 8) = 8
73204 read(6, "\1\0\0\0\0\0\0", 8) = 8
73270 write(6, "\1\0\0\0\0\0\0", 8) = 8
73270 read(6, "\1\0\0\0\0\0\0", 8) = 8
73204 write(10, "\1\0\0\0\0\0\0", 8) = 8
73202 read(10, <unfinished ...>
73270 write(8, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73202 <... read resumed> "\1\0\0\0\0\0\0", 8) = 8
73270 <... write resumed>) = 8
73268 read(8, "\1\0\0\0\0\0\0", 8) = 8
73202 write(6, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73268 write(6, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73202 <... write resumed>) = 8
73268 <... write resumed>) = 8
73270 read(6, "\1\0\0\0\0\0\0", 8) = 8

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73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 read(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73270 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73268 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73268 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73270 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73270 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73268 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 read(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(1, "Ok: 73268\\n", 10) = 10
73024 read(0, "remove 20\\n", 1024) = 10
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 write(1, "[WORKER] Removing node 20...\\n", 29) = 29

Узел 20 удаляется из системы.

Используется в remove() в node.h.

73202 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73270 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73268 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73268 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73270 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 write(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 read(10, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73202 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73204 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73270 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73268 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

```

73268 write(1, "[WORKER] Removing node 40...\n", 29) = 29

73268 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73270 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73268 write(4, "\1\0\0\0\0\0\0\0", 8) = 8

73268 write(1, "[WORKER] Node 40 removed success"..., 39 <unfinished ...>

73270 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73268 <... write resumed> = 39

73204 write(10, "\1\0\0\0\0\0\0\0", 8) = 8

73269 read(4, "\1\0\0\0\0\0\0\0", 8) = 8

73202 read(10, "\1\0\0\0\0\0\0\0", 8) = 8

73202 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73202 write(4, "\1\0\0\0\0\0\0\0", 8) = 8

73269 read(8, <unfinished ...>

73204 read(6, <unfinished ...>

73269 <... read resumed> "\1\0\0\0\0\0\0\0", 8) = 8

73204 <... read resumed> "\1\0\0\0\0\0\0\0", 8) = 8

73269 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

73202 write(1, "[WORKER] Node 20 removed success"..., 39 <unfinished ...>

73203 read(4, "\1\0\0\0\0\0\0\0", 8) = 8

73202 <... write resumed> = 39

73270 read(6, <unfinished ...>

73204 write(10, "\1\0\0\0\0\0\0\0", 8 <unfinished ...>

73270 <... read resumed> "\1\0\0\0\0\0\0\0", 8) = 8

73204 <... write resumed> = 8

73270 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73204 write(8, "\1\0\0\0\0\0\0\0", 8) = 8

73105 write(10, "\1\0\0\0\0\0\0\0", 8) = 8

73269 read(8, "\1\0\0\0\0\0\0\0", 8) = 8

73102 read(10, <unfinished ...>

73203 write(6, "\1\0\0\0\0\0\0\0", 8 <unfinished ...>

```

73102 <... read resumed>"\1\0\0\0\0\0\0", 8) = 8

73203 <... write resumed>) = 8

73269 write(4, "\1\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0", 8) = 8

73269 read(4, "\1\0\0\0\0\0\0", 8) = 8

73204 read(6, "\1\0\0\0\0\0\0", 8) = 8

73203 read(10, "\1\0\0\0\0\0\0", 8) = 8

73203 write(6, "\1\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0", 8) = 8

73204 read(6, "\1\0\0\0\0\0\0", 8) = 8

73204 write(10, "\1\0\0\0\0\0\0", 8 <unfinished ...>

73203 read(8, "\1\0\0\0\0\0\0", 8) = 8

73204 <... write resumed>) = 8

73026 write(9, "\1\0\0\0\0\0\0", 8 <unfinished ...>

73204 write(8, "\1\0\0\0\0\0\0", 8) = 8

73026 <... write resumed>) = 8

73024 read(9, "\1\0\0\0\0\0\0", 8) = 8

73203 read(10, <unfinished ...>

73024 write(1, "Ok\n", 3 <unfinished ...>

73203 <... read resumed>"\1\0\0\0\0\0\0", 8) = 8

73024 <... write resumed>) = 3

73024 read(0, <unfinished ...>

73105 write(6, "\1\0\0\0\0\0\0", 8) = 8

73203 write(4, "\1\0\0\0\0\0\0", 8) = 8

73203 read(8, <unfinished ...>

73105 read(6, <unfinished ...>

73203 <... read resumed>"\1\0\0\0\0\0\0", 8) = 8

73105 <... read resumed>"\1\0\0\0\0\0\0", 8) = 8

73105 write(10, "\1\0\0\0\0\0\0", 8) = 8

73203 read(4, "\1\0\0\0\0\0\0", 8) = 8

```

73268 write(4, "\1\0\0\0\0\0\0", 8) = 8
73269 read(4, "\1\0\0\0\0\0\0", 8) = 8
73269 write(3, "\1\0\0\0\0\0\0", 8) = 8
73268 read(3, "\1\0\0\0\0\0\0", 8) = 8
73268 write(6, "\1\0\0\0\0\0\0", 8) = 8
73269 +++ exited with 0 +++
73270 read(6, "\1\0\0\0\0\0\0", 8) = 8
73202 write(4, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73270 +++ exited with 0 +++
73202 <... write resumed> = 8
73203 read(4, "\1\0\0\0\0\0\0", 8) = 8
73203 write(3, "\1\0\0\0\0\0\0", 8 <unfinished ...>
73268 +++ exited with 0 +++
73203 <... write resumed> = 8
73202 --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=73268, si_uid=1000,
si_status=0, si_utime=0, si_stime=2} ---
73202 read(3, "\1\0\0\0\0\0\0", 8) = 8
73202 write(6, "\1\0\0\0\0\0\0", 8) = 8
73203 +++ exited with 0 +++
73204 read(6, "\1\0\0\0\0\0\0", 8) = 8
73204 +++ exited with 0 +++
73202 +++ exited with 0 +++
73102 --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=73202, si_uid=1000,
si_status=0, si_utime=0, si_stime=4} ---
73024 <... read resumed>"exec 20 time\n", 1024) = 13
73024 write(1, "Error: Not found\n", 17) = 17
73024 read(0, "exec 40 time\n", 1024) = 13
73024 write(1, "Error: Not found\n", 17) = 17
73024 read(0, "exec 10 start\n", 1024) = 14
73024 write(6, "\1\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0", 8) = 8

```

```

73105 write(8, "\1\0\0\0\0\0\0\0", 8)  = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 write(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 write(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 write(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8)   = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8)   = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8)   = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8)   = 8

```

73024 write(1, "Ok:10:timer started\n", 20) = 20

73024 read(0, "exec 30 start\n", 1024) = 14

73024 write(6, "\1\0\0\0\0\0\0", 8) = 8

73026 read(6, "\1\0\0\0\0\0\0", 8) = 8

73105 write(8, "\1\0\0\0\0\0\0", 8) = 8

73102 read(8, "\1\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0", 8) = 8

73026 write(9, "\1\0\0\0\0\0\0", 8) = 8

73024 read(9, "\1\0\0\0\0\0\0", 8) = 8

73024 write(6, "\1\0\0\0\0\0\0", 8) = 8

73026 read(6, "\1\0\0\0\0\0\0", 8) = 8

73105 write(8, "\1\0\0\0\0\0\0", 8) = 8

73102 read(8, "\1\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0", 8) = 8

73237 write(8, "\1\0\0\0\0\0\0", 8) = 8

73235 read(8, "\1\0\0\0\0\0\0", 8) = 8

73235 write(6, "\1\0\0\0\0\0\0", 8) = 8

73237 read(6, "\1\0\0\0\0\0\0", 8) = 8

73105 write(13, "\1\0\0\0\0\0\0", 8) = 8

73102 read(13, "\1\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0", 8) = 8

73105 read(6, "\1\0\0\0\0\0\0", 8) = 8

73237 write(8, "\1\0\0\0\0\0\0", 8) = 8

73235 read(8, "\1\0\0\0\0\0\0", 8) = 8

73235 write(6, "\1\0\0\0\0\0\0", 8) = 8

73237 read(6, "\1\0\0\0\0\0\0", 8) = 8

73105 write(13, "\1\0\0\0\0\0\0", 8) = 8

73102 read(13, "\1\0\0\0\0\0\0", 8) = 8

73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 write(13, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(13, "\1\0\0\0\0\0\0\0", 8) = 8
73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
73235 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73237 read(6, "\1\0\0\0\0\0\0\0", 8) = 8

73105 write(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(1, "Ok:30:timer started\\n", 20) = 20
73024 read(0, "exec 10 stop\\n", 1024) = 13
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(1, "Ok:10:timer stopped at 11707 ms\\n", 32) = 32
73024 read(0, "exec 30 stop\\n", 1024) = 13
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73105 write(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

73235 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73235 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73237 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(13, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(1, "Ok:30:timer stopped at 13267 ms\\n", 32) = 32
73024 read(0, "exec 10 time\\n", 1024) = 13
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 write(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 read(9, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73024 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73026 read(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73105 write(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8
73102 read(8, "\\1\\0\\0\\0\\0\\0\\0\\0", 8) = 8

```

73102 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 write(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73105 write(8, "\1\0\0\0\0\0\0\0", 8) = 8
73102 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
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73102 read(8, "\1\0\0\0\0\0\0\0", 8) = 8
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73105 read(6, "\1\0\0\0\0\0\0\0", 8) = 8
73026 write(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 read(9, "\1\0\0\0\0\0\0\0", 8) = 8
73024 write(1, "Ok:10:elapsed 11707 ms\n", 23) = 23
73024 read(0, <unfinished ...>
73105 +++ killed by SIGKILL +++
73104 +++ killed by SIGKILL +++
73102 +++ killed by SIGKILL +++
73024 <... read resumed>0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is
set)
73024 --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_KILLED, si_pid=73102, si_uid=1000,
si_status=SIGKILL, si_utime=0, si_stime=8} ---
73024 read(0, <unfinished ...>
73237 write(6, "\1\0\0\0\0\0\0\0", 8) = 8

```

```
73026 write(6, "\\1\\0\\0\\0\\0\\0\\0\\0", 8)  = 8
```

```
73237 read(6, <unfinished ...>
```

```
73026 read(6, <unfinished ...>
```

73237 <... read resumed>"\1\0\0\0\0\0\0", 8) = 8

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73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

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73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73024 <... read resumed>"exec 30 time\n", 1024) = 13

73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

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73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

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73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73024 write(1, "Error: Node is unavailable\n", 27) = 27

73024 read(0, <unfinished ...>

73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
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73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
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EINPROGRESS (Operation now in progress)

73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

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EINPROGRESS (Operation now in progress)

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73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
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73237 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 9

73237 connect(9, {sa_family=AF_INET, sin_port=htons(4070), sin_addr=inet_addr("127.0.0.1")}, 16) = -1
EINPROGRESS (Operation now in progress)

73024 <... read resumed>0x5594100ca480, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART is set)

73024 --- SIGINT {si_signo=SIGINT, si_code=SI_KERNEL} ---

73235 --- SIGINT {si_signo=SIGINT, si_code=SI_KERNEL} ---

73237 +++ killed by SIGINT +++

73236 +++ killed by SIGINT +++

73026 +++ killed by SIGINT +++

73025 +++ killed by SIGINT +++

73024 +++ killed by SIGINT +++

73235 +++ killed by SIGINT +++

Вывод

В процессе выполнения лабораторных работ по курсу операционных систем мне особенно понравилось использовать возможности утилит strace, NtTrace. Они поспособствовали более глубокому пониманию внутренней работы функций, применяемых при программировании, а также помогали в отладке, указывая на места возникновения ошибок. Благодаря множеству флагов и дополнительных функций эти утилиты являются мощным инструментом, знание которых крайне важно.