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/* Sample solution to Lab-7 assignment.
 * To Compile: gcc -Wall -o lab7 lab7_solution.c
 * To Run: ./lab7 commands.txt
 */
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>
#include <time.h>
#include <string.h>
#include <fcntl.h>
#include <sys/stat.h>

void createarray(char *buf, char **array)
{
    int i, count, len;
    len = strlen(buf);
    buf[len - 1] = '\\0'; /* replace last character (\n) with \0 */
    for (i = 0, array[0] = &buf[0], count = 1; i < len; i++)
    {
        if (buf[i] == ' ')
        {
            buf[i] = '\\0';
            array[count++] = &buf[i + 1];
        }
    }
    array[count] = (char *)NULL;
}

int main(int argc, char **argv)
{
    pid_t pid;
    int status;
    char line[BUFSIZ], buf[BUFSIZ], *args[BUFSIZ];
    time_t t1, t2;

    if (argc < 2)
    {
        printf("Usage: %s <commands file>\n", argv[0]);
        exit(-1);
    }

    FILE *fp1 = fopen(argv[1], "r");
    if (fp1 == NULL)
    {
        printf("Error opening file %s for reading\n", argv[1]);
        exit(-1);
    }

    FILE *fp2 = fopen("output.log", "w");
    if (fp2 == NULL)
    {
        printf("Error opening file output.log for writing\n");
        exit(-1);
    }

    while (fgets(line, BUFSIZ, fp1) != NULL)
    {
        strcpy(buf, line);
        createarray(line, args);

        time(&t1);
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pid = fork();
if (pid == 0)
{
    int redi = getpid();
    char node1[10], node2[10];
    sprintf(node1, "%d", redi);
    sprintf(node2, "%d", redi);
    strcat(node1, ".out");
    strcat(node2, ".err");

    int redirect_log = open(node1, O_CREAT | O_APPEND | O_WRONLY, 0777);
    int redirect_err = open(node2, O_CREAT | O_APPEND | O_WRONLY, 0777);
    if (redirect_log == -1)
    {
        printf("error");
        return 0;
    }

    dup2(redirect_log, 1);
    dup2(redirect_err, 2);
    execvp(args[0], args);

    perror("exec");
    exit(-1);
}

else if (pid > 0)
{
    printf("Child started at %s", ctime(&t1));
    printf("Wait for the child process to terminate\n");
    wait(&status);
    time(&t2);
    printf("Child ended at %s", ctime(&t2));
    if (WIFEXITED(status))
    {
        printf("Child process exited with status = %d\n", WEXITSTATUS(status));
    }
    else
    {
        printf("Child process did not terminate normally!\n");
    }
    buf[strlen(buf) - 1] = '\t'; /* replace \n included by fgets with \t */
    strcat(buf, ctime(&t1));      /* append start time to command with arguments */
    buf[strlen(buf) - 1] = '\t'; /* replace \n added by ctime at the end with \t */

    strcat(buf, ctime(&t2));      /* append end time */
    fprintf(fp2, "%s", buf);
    fflush(fp2);
}
else
{
    /* we have an error */
    perror("fork"); /* use perror to print the system error message */
    exit(EXIT_FAILURE);
}

fclose(fp1);
fclose(fp2);
printf("[%ld]: Exiting main program ..... \n", (long)getpid());

return 0;
}
```

