

**EA872 - Laboratório de Programação de Software Básico**  
**Atividades Práticas – Aula 9**

**Larissa Saemi Ganaha**  
**Lucca Maia Bollani**

**RA: 171730**  
**RA: 158182**

*Para a compilação do programa, chame **make all** na pasta do arquivo no terminal.*

Para o funcionamento do servidor, foram criadas as seguintes funções

```
char *formatdate(char *buff, time_t val);
void getCabecalho(char *local, command_list * requisicao);
void getOutput(command_list * requisicao);
int escreveArquivo(char address[ADDRESS_SIZE], struct stat fileStat);
int get_access(char *local );
command_list * findParam(command_list * requisicao, char * param);
void erro(tipo_cabecalho tipo);
```

De modo que **formatdate** foi criada a fim de deixar a data na forma de Date, mostrando a data completa por extenso, horário e fuso horário: 08 Oct 2017 23:18:11 GMT

```
char *formatdate(char *buff, time_t val){
    strftime(buff,200, "%c %Z", localtime(&val));
    return buff;
}
```

A função **getCabecalho** irá dar como saída o cabeçalho correspondente a requisição HTTP, ou a um tipo de erro que foi gerado, imprimindo para cada caso um cabeçalho específico.

```
...
if(tipo > 3){
    //temos um cabecalho de erro
    switch (tipo) {
        case BAD_REQUEST:
            printf("HTTP/1.1 \t400 Bad Request\n");
            printf("Date: \t\t%s\n",buffer);
            printf("Server: \tServidor HTTP ver. 0.2 Grupo 7\n");
            printf("Content-Length: 219\n");
            printf("Connection: \tclose\n");
            printf("Content-Type: \ttext/html\n");
            break;
        case FORBIDDEN:
            printf("%s ", requisicao->params->param); //http/1.1
            printf("403 Forbidden\n");
            printf("Date: \t\t%s\n",buffer);
            printf("Server: \tServidor HTTP ver. 0.2 Grupo 7\n");
            printf("Content-Length: 203\n");
            printf("Content-Type: \ttext/html\n");
            break;
        ...
    }
}
```

A função **getOutput** é o que "comanda" as saídas que serão geradas, tratando se a lista de comandos que foi recebida é nula, verifica se a requisição possui os parâmetros que são necessários, caso contrário retorna um tipo de erro e então, chama a função *getCabecalho* que irá gerar a saída correspondente a requisição.

```
...

//caso BAD_REQUEST
if(requisicao == NULL){
    getCabecalho(NULL, NULL, BAD_REQUEST);
    printf("\n\n");
    erro(BAD_REQUEST);
}
//caso BAD_REQUEST por falta de Host (por enquanto pode ser qualquer host)
else if(!(findParam(requisicao, "Host")) ){
    getCabecalho(NULL, NULL, BAD_REQUEST);
    printf("\n\n");
    erro(BAD_REQUEST);
}

...
```

A função *escreveArquivo* irá escrever a saída na saída padrão, verificando previamente se o arquivo é existente e se permite permissão de leitura.

```
...

//tenta abrir o arquivo
if ((file = open(address, O_RDONLY, 0600)) < 0){
    fprintf(stderr, "Erro na abertura de %s (tem permissao de leitura).\n", address);
    exit(0);
}

//le e escreve o arquivo na saida padrao
while( (size = read(file, buf, sizeof(buf))) > 0 ){
    if(write(1, buf, size) < 0){
        fprintf(stderr, "Erro na escrita de %s.\n", address);
        exit(0);
    }
}

...
```

A função `get_access` concatena o caminho provido pela requisição HTTP e verifica se é um diretório ou arquivo, verifica as permissões de acesso. Caso seja um diretório e possua a permissão de execução, verifica a existência dos arquivos `index.html` ou `welcome.html` e caso exista um, imprime na saída chamando a função `escreveArquivo`.

```
...

//verifica se o welcome.html existe, e associa ele a fileStat
if(stat(temp_address,&fileStat) >= 0){
    //gambiarra extrema to com sono
    if( (fileStat.st_mode & S_IRUSR) ){
        if(imprimir) escreveArquivo(temp_address, fileStat);
        return 0;
    }
    return FORBIDDEN;
}

...
```

A função `findParam` irá percorrer a lista de parâmetros e achar um específico, como no caso de "Connection" que é retornado nas requisições HTTP, para que seja impresso na saída padrão.

```
...

while (current->next != NULL) {
    current = current->next;

    if(strcmp(current->command , param) == 0){
        return current;
    }
}
return NULL;

...
```

A função `erro` trata os erros e como eles devem sair na resposta dada pelo servidor. Os tratamentos estão estruturados de forma que:

```
switch (tipo) {
    case BAD_REQUEST:
        strcpy(title, "400 Bad Request");
        strcpy(h1, "Bad Request");
        strcpy(paragraph, "Your browser sent a request that this server could not understand.");
        break;

    case FORBIDDEN:
        strcpy(title, "403 Forbidden");
        strcpy(h1, "Forbidden");
        strcpy(paragraph, "You do not have the permission to access this resource");
}
```

```

    break;
case NOT_FOUND:
    strcpy(title, "404 Not Found");
    strcpy(h1, "Not Found");
    strcpy(paragraph, "The requested URL was not found on this server.");
    break;

...

```

Realizando o teste das funções implementadas, temos:

- Funcionamento e tratamento da requisição GET:

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
GET /dir1 HTTP/1.1
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1      400 Bad Request
Date:         Mon Oct  9 23:07:22 2017 BRT
Server:       Servidor HTTP ver. 0.2 Grupo 7
Content-Length: 219
Connection:   close
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>400 Bad Request</title>
</head><body>
<h1>Bad Request</h1>
<p>Your browser sent a request that this server could not understand.
</p>
</body></html>

```

[PRINT DO GET]

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
GET /dir1 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt

HTTP/1.1      200 OK
Date:         Mon Oct  9 23:06:04 2017 BRT
Server:       Servidor HTTP ver. 0.2 Grupo 7
Last-Modified: Sun Oct  1 19:12:30 2017 BRT
Accept-Ranges: bytes
Content-Length: 4096 bytes
Vary:         Accept-Encoding
Content-Type:  text/html
Connection:   keep-alive

<html>
  <head>
    <title>          </title>
    <style type="text/css">
    <!--
    h1 {text-align:center;
       font-family:Arial, Helvetica, Sans-Serif;
       }

    p  {text-indent:20px;
       }
    -->
  </style>
</head>
<body bgcolor = "#ffffcc" text = "#000000">
<h1>INDEX.HTML !</h1>

```

[PRINT DO GET COM HOST]



```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
GET /dir3 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1 404 Not Found
Date: Mon Oct 9 23:08:20 2017 BRT
Server: Servidor HTTP ver. 0.2 Grupo 7
Content-Length: 200
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>404 Not Found</title>
</head><body>
<h1>Not Found</h1>
<p>The requested URL /OI was not found on this server.
</p>
</body></html>

```

#### [PRINT DO GET COM ERRO 404 NOT FOUND]

- Funcionamento e tratamento da requisição HEAD:

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
HEAD /dir1 HTTP/1.1
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1 400 Bad Request
Date: Mon Oct 9 23:10:06 2017 BRT
Server: Servidor HTTP ver. 0.2 Grupo 7
Content-Length: 219
Connection: close
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>400 Bad Request</title>
</head><body>
<h1>Bad Request</h1>
<p>Your browser sent a request that this server could not understand.
</p>
</body></html>

```

#### [PRINT DO HEAD]

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
HEAD /dir1 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1      200 OK
Date:         Mon Oct  9 23:09:10 2017 BRT
Server:       Servidor HTTP ver. 0.2 Grupo 7
Last-Modified: Sun Oct  1 19:12:30 2017 BRT
Accept-Ranges: bytes
Content-Length: 4096 bytes
Vary:         Accept-Encoding
Content-Type:  text/html
Connection:   keep-alive

```

[PRINT DO HEAD COM HOST]

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
HEAD /dir2 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1 403 Forbidden
Date:         Mon Oct  9 23:10:55 2017 BRT
Server:       Servidor HTTP ver. 0.2 Grupo 7
Content-Length: 203
Content-Type:  text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You do not have the permission to access this resource
</p>
</body></html>

```

[PRINT DO HEAD COM ERRO 403 FORBIDDEN]



- Funcionamento da requisição TRACE

```
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
TRACE /dir1 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1      200 OK
Server:       Servidor HTTP ver. 0.2 Grupo 7
Date:         Mon Oct 9 23:11:49 2017 BRT
Connection:   keep-alive
Content-Type: text/html
Content-Length: 4096 bytes
```

#### [PRINT DO TRACE]

- Funcionamento da requisição OPTIONS:

```
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
OPTIONS /dir1 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1      200 OK
Date:         Mon Oct 9 23:14:53 2017 BRT
Server:       Servidor HTTP ver. 0.2 Grupo 7
Allow:        GET, HEAD, TRACE, OPTIONS
Content-Length: 0
Content-Type: text/html
```

#### [PRINT DO OPTIONS]



```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
OPTIONS /dir1 HTTP/1.1
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1 400 Bad Request
Date: Mon Oct 9 23:15:26 2017 BRT
Server: Servidor HTTP ver. 0.2 Grupo 7
Content-Length: 219
Connection: close
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>400 Bad Request</title>
</head><body>
<h1>Bad Request</h1>
<p>Your browser sent a request that this server could not understand.
</p>
</body></html>

```

#### [PRINT DO OPTIONS COM ERRO 400 BAD REQUEST]

- Funcionamento da requisição NÃO PERMITIDA:

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
PUT /dir1 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1 405 Method Not Allowed
Date: Mon Oct 9 23:16:38 2017 BRT
Server: Servidor HTTP ver. 0.2 Grupo 7
Allow: GET, HEAD, TRACE, OPTIONS
Content-Length: 212
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>405 Method Not Allowed</title>
</head><body>
<h1>Not Allowed</h1>
<p>The requested method was not allowed on this server.
</p>
</body></html>

```

#### [PRINT DO ERRO 405]

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
POST /dir1 HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt
HTTP/1.1 405 Method Not Allowed
Date: Mon Oct 9 23:17:33 2017 BRT
Server: Servidor HTTP ver. 0.2 Grupo 7
Allow: GET, HEAD, TRACE, OPTIONS
Content-Length: 212
Content-Type: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>405 Method Not Allowed</title>
</head><body>
<h1>Not Allowed</h1>
<p>The requested method was not allowed on this server.
</p>
</body></html>

```

[PRINT DO ERRO 405]

```

lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat input.txt
GET /dir1/texto2.html HTTP/1.1
Host: localhost:5001
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ ./aula8 input.txt output.txt
Starting program to call the parser and process a request...
Finished!
lucca@lucca-X551CA:~/Documents/Material/Ea872/TURMA2/EA872-Aula8/Analizador
$ cat output.txt

HTTP/1.1      200 OK
Date:         Mon Oct  9 23:22:44 2017 BRT
Server:       Servidor HTTP ver. 0.2 Grupo 7
Last-Modified: Fri Sep 29 14:48:05 2017 BRT
Accept-Ranges: bytes
Content-Length: 356 bytes
Vary:         Accept-Encoding
Content-Type:  text/html
Connection:   keep-alive

<html>
  <head>
    <title>      </title>
    <style type="text/css">
    <!--
      h1      {text-align:center;
        font-family:Arial, Helvetica, Sans-Serif;
        }

      p      {text-indent:20px;
        }
    -->
  </style>
</head>
<body bgcolor = "#ffffcc" text = "#000000">
<h1>TEXT02.HTML !</h1>

```

[PRINT DE ACESSO A UM RECURSO ESPECIFICO]