

# Unit 7: Input/Output Files

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# SUMMARY

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# Read and Write ASCII Files

- An ASCII file contains ASCII characters
  - Text files which can be read by a naked eye
- The process will be:
  - Open file (*fopen*)
  - Read or write information (*fscanf*, *textscan*, *fprintf*, ...)
  - Close file (*fclose*)

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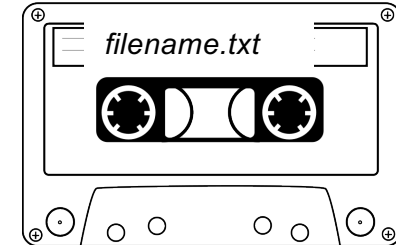
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# Opening files

```
fid = fopen ('students.txt', 'rt')
```

Pointer

Open file for reading



↓  
Student name: Pedro - Age: 19 – Bachelor Degree: Biom

```
fid = fopen ('students.txt', 'at')
```

Pointer

Open file, or create new file, for writing; append data to the end of the file.

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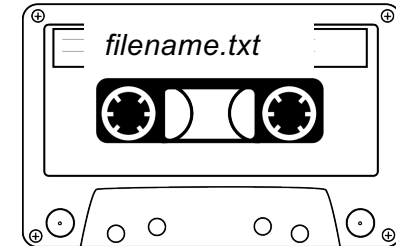
# Opening files

```
fid = fopen ('students.txt', 'wt')
```

Pointer



~~Student name: Pedro - Age: 19 - Bachelor Degree: Biom~~



Open file, or create new file, for writing;  
discard existing contents, if any

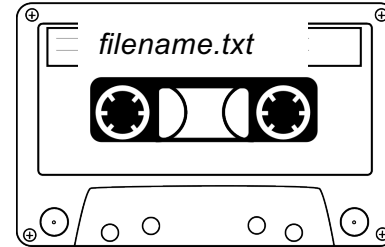
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# Writing ASCII files



Pointer



achelor Degree: Biomedical

EOF

```
fprintf(vfile, '%s', 'Engineering');
```

Pointer



achelor Degree: Biomedical Engineering

EOF

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Reading one piece of  
information each time

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# Reading ASCII files

- You can use three different commands to read from a text file:
  - `fscanf` => returns the data read **in a vector or matrix**

```
var = fscanf (fid, '%d', 1);
```

- `textscan` => returns the data read **in a cell array**

```
C = textscan (fid, '%s', 1);
```

- `fgets` => returns **a whole line** (until `\n`) of text **in a string**

```
vline = fgets (fid);
```

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# Reading ASCII files

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var = fscanf (fid, '%d', 1);
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- `textscan` => returns the data read **in a cell array**

```
C = textscan (fid, '%s', 1);
```

- `fgets` => returns **a whole line** (until `\n`) of text **in a string**

```
vline = fgets (fid);
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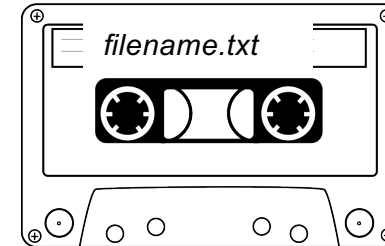
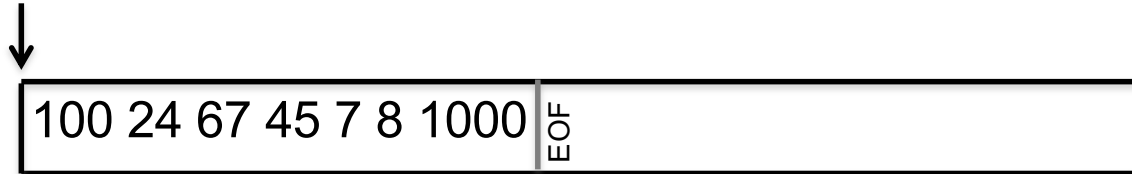
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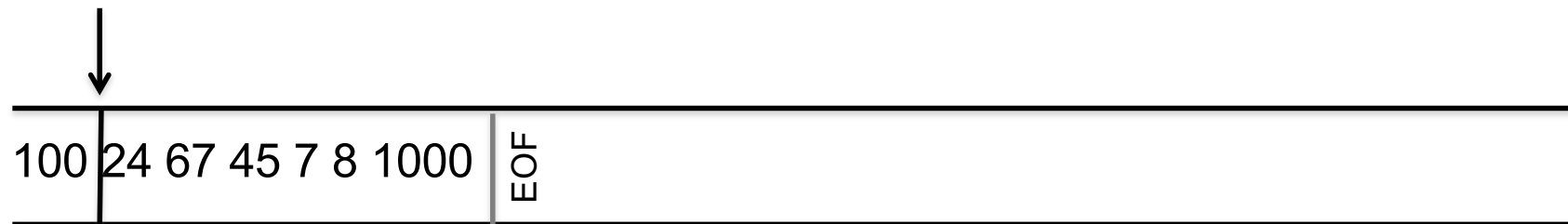
# Reading ASCII files

Pointer



```
var = fscanf (fid, '%d', 1);
```

Pointer



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# Reading ASCII files

## IMPORTANT:

TEXTSCAN returns a cellarray whose cells are either:

- cellarrays: when reading strings
- vectors: when reading numbers

Pointer



Bachelor Degree Biomedical Engineering	EOF
--	-----

```
C = textscan (fid, '%s', 1);
```

Pointer



Bachelor	Degree Biomedical Engineering	EOF
----------	-------------------------------	-----

C

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# Reading ASCII files

## IMPORTANT:

TEXTSCAN returns a cellarray whose cells are either:

- cellarrays: when reading strings
- vectors: when reading numbers

Pointer



```
C = textscan (fid, '%d', 1);
```

Pointer



C

C{1} ← [3]

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# Reading ASCII files in lines

Pointer



Bachelor Degree - Biomedical Engineering\nBachelor De

```
vline = fgets (fid);
```

Pointer



Bachelor Degree - Biomedical Engineering\nBachelor De

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# Example

- You can read a whole file that contains strings using either one of the three commands and a loop

```
vfile = fopen('sentence.txt','rt');  
while feof(vfile) == 0  
    vword = fscanf (vfile,'%s',1);  
    fprintf('\nThe word is: %s', vword);  
end  
fclose(vfile);
```

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# Example

- You can read a whole file that contains strings using either one of the three commands and a loop

```
vfile = fopen('sentence.txt','rt');  
while feof(vfile) == 0  
    cword = textscan (vfile,'%s',1);  
    fprintf('\nThe word is: %s', cword{1}{1});  
end  
fclose(vfile);
```

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# Example

- You can read a whole file that contains strings using either one of the three commands and a loop

```
vfile = fopen('sentence.txt','rt');  
while feof(vfile) == 0  
    vline = fgets (vfile);  
    fprintf('\nThe line is: %s', vline);  
end  
fclose(vfile);
```

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# Reading more than one piece of information each time

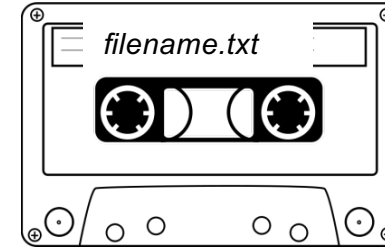
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# Reading more than one information at a time: textscan



Pointer



```
C = textscan (fid, '%s : %s', 1);
```

Pointer



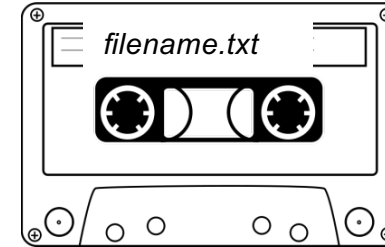
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# Reading more than one information at a time: textscan



Pointer



```
C = textscan (fid, '%s %d', 1);
```

Pointer



```
C
```



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# Example

- You can read a whole file reading more than one piece of data at time

```
vfile = fopen('sentence.txt','rt');  
while feof(vfile) == 0  
    cdata = textscan (vfile,'%s %d',1);  
    fprintf('\n %s scored %d' in the exam, cdata{1}{1}, cdata{2}(1));  
end  
fclose(vfile);
```

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# What if I need to keep the whole content of the file in memory?

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# What if I need to keep the whole content of the file in memory?

You will need to organize the information in a data structure:

- a vector: if there are only numbers
- a vector of structures or a cellarray: if there are strings or something different to just numbers

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# Example

- If you only read one piece of information of the same type (numbers or characters) you can use a vector

```
marks = []
count = 0;
vfile = fopen('marks.txt','rt');
while feof(vfile) == 0
    vmark = fscanf (vfile,'%d',1);
    count = count + 1;
    marks[count] = vmark;
```

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# Example

- If you read strings you can't use vectors, so you could use a vector of structures or a cellarray

```
clear cnames;
count = 0;
vfile = fopen('names.txt','rt');
while feof(vfile) == 0
    sname = textscan (vfile,'%s',1);
    count = count + 1;
    vst(count).name = sname{1}{1};    or    cnames{count} = sname{1}{1};
end
fclose(vfile);
```

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# Example

- When you read different types of information the best solution is to use a vector of structures

```
students = struct('name','','mark',0);
count = 0;
vfile = fopen('sentence.txt','rt');
while not(feof(vfile))
    cdata = textscan (vfile,'%s %d',1);
    count = count + 1;
    student(count).name = cdata{1}{1};
    student(count).mark = cdata{2}(1);
```

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