

DVT course:

Basic C/C++ Skills of Image Processing

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2013/9/17

Basic C/C++ Skills (1/7)

- Data type for image array

- 2D array:

- ```
unsigned char R[Height][Width];
```

- 1D array:

- ```
unsigned char R[Height*Width];
```

- The range of unsigned char : 0~255
- This is **static array** on **stack memory**

***2D array is instinct for image processing, but it is hard to reduce the computation.*

Ex: **1D array**

```
for(int i=0; i<Width*Height; ++i) R[i] = 100;
```

2D array

```
for(int i=0; i<Height; ++i)
  for(int j=0; j<Width; ++j)
    R[i][j] = 100;
```

Basic C/C++ Skills (2/7)

- The dynamic array on memory heap

- 2D array:

```
unsigned char **R = new unsigned char *[Height];  
for(int i=0; i<Height; i++)  
    R[i] = new unsigned char [Width];
```

...

```
for(int i=0; i<Height; i++)  
    delete [ ] R[i];  
delete [ ] R;
```

➤ Trumen recommend **1D dynamic** array for image processing !!

- 1D array:

```
unsigned char *R = new unsigned char [Height*Width];
```

...

```
delete [ ] R;
```

Basic C/C++ Skills (3/7)

- Open image file -- fopen()

```
#include <stdio.h>
```

Read :

```
FILE *ReadPtr = fopen( "Hello.raw" , "rb" );
```

...

```
fclose(ReadPtr);
```

Read the file located on the project folder

Write :

```
FILE *WritePtr = fopen( "D:\Image\Hello.raw" , "wb" );
```

...

```
fclose(WritePtr);
```

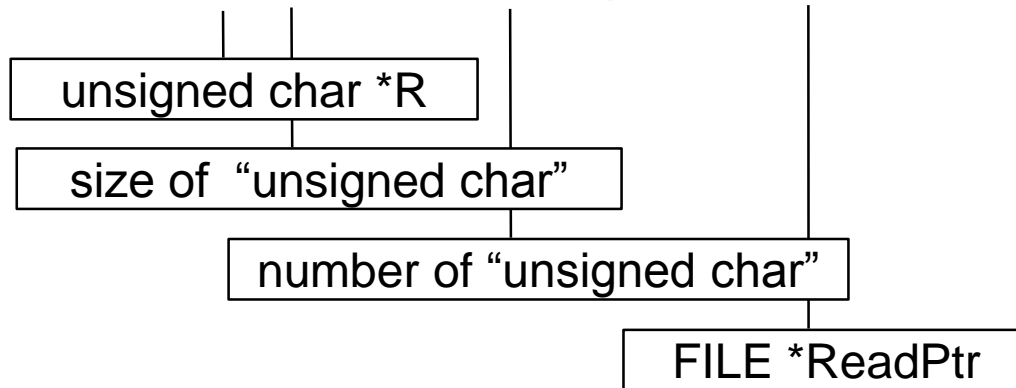
Write out the file located on the target folder

Basic C/C++ Skills (4/7)

- Read/Write image file -- fread(), fwrite()

Read :

```
fread(R, 1, Width*Height, ReadPtr);
```



Write :

```
fwrite(R, 1, Width*Height, WritePtr);
```

Basic C/C++ Skills (5/7)

- Read/Write image file -- fgetc(), fputc()

Read :

```
for(int i=0; i<Height; i++)  
    for(int j=0; j<Width; j++)  
        R[i*Width+j] = fgetc(ReadPtr);
```

unsigned char *R

FILE *ReadPtr

Read 1 pixel each time

Write :

```
for(int i=0; i<Height; i++)  
    for(int j=0; j<Width; j++)  
        fputc(R[i*Width+j], WritePtr);
```

Write 1 pixel each time

Basic C/C++ Skills (6/7)

- Image array processing -- `fseek()`, `ftell()`

Seek:

```
fseek(ReadPtr, 0, SEEK_SET);  
fread(R, 1, Width*Height, ReadPtr);
```

Diagram: A box labeled "offset" points to the second argument (0) in the `fseek` call. A box labeled "origin" points to the third argument (`SEEK_SET`) in the `fseek` call.

<code>SEEK_SET</code>	Beginning of file
<code>SEEK_CUR</code>	Current position of the file pointer
<code>SEEK_END</code>	End of file

Seek:

```
fseek(ReadPtr, Width*Height/2, SEEK_SET);  
R[i] = fgetc(ReadPtr);
```

File Size:

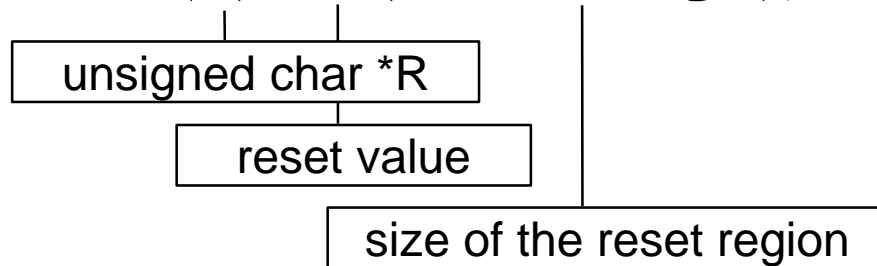
```
fseek(ReadPtr, 0, SEEK_END);  
Number = ftell(ReadPtr)/(Width*Height);
```

Basic C/C++ Skills (7/7)

- Image array processing -- memcpy(), memset()

Reset:

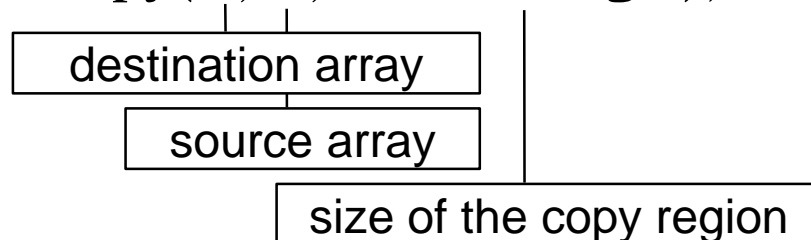
```
memset(R, 0x00, Width*Height);
```



Reset the image array size
Width*Height with **0x00**

Copy :

```
memcpy(G, R, Width*Height);
```



Copy **R** to **G** with array size
Width*Height