CO6041
Digital Image Processing
Assignment#1

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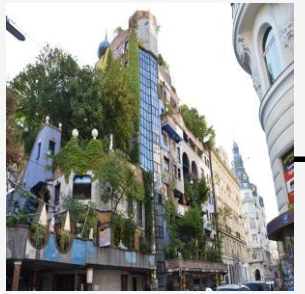
Block Diagram



512 × 512
24-bit bmp

1-1

Extract header informatoin

Extract pixel information

1-2

Transform to gray-level image

512 × 512
8-bit bmp

1-5

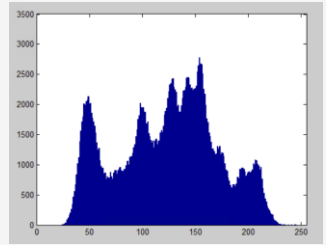
Calculate gray-level histogram

1-4

Downsample and merge

Calculate gray-level histogram

1-3



256 pixels

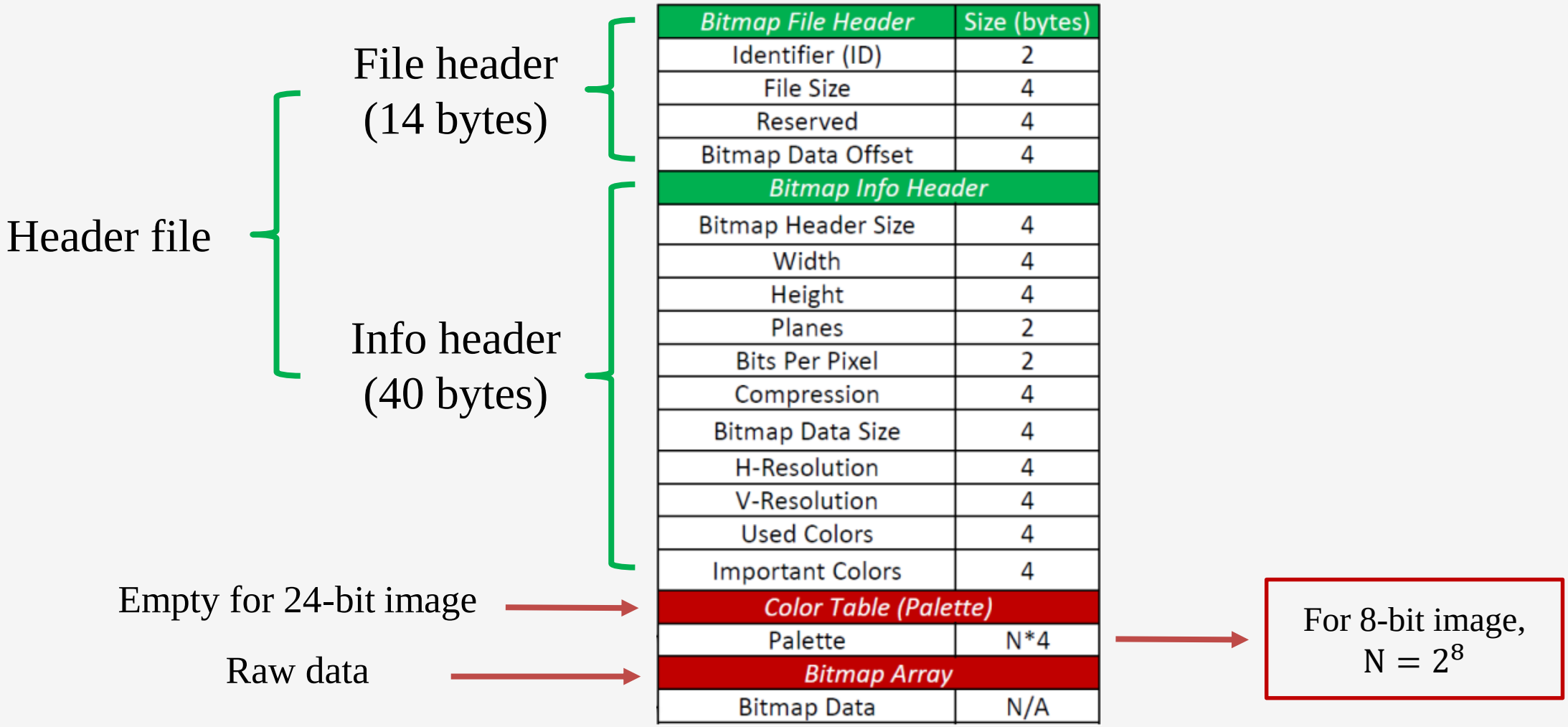
512 pixels

merge

Downsample along odd rows (↓2)

Downsample along even rows (↓2)

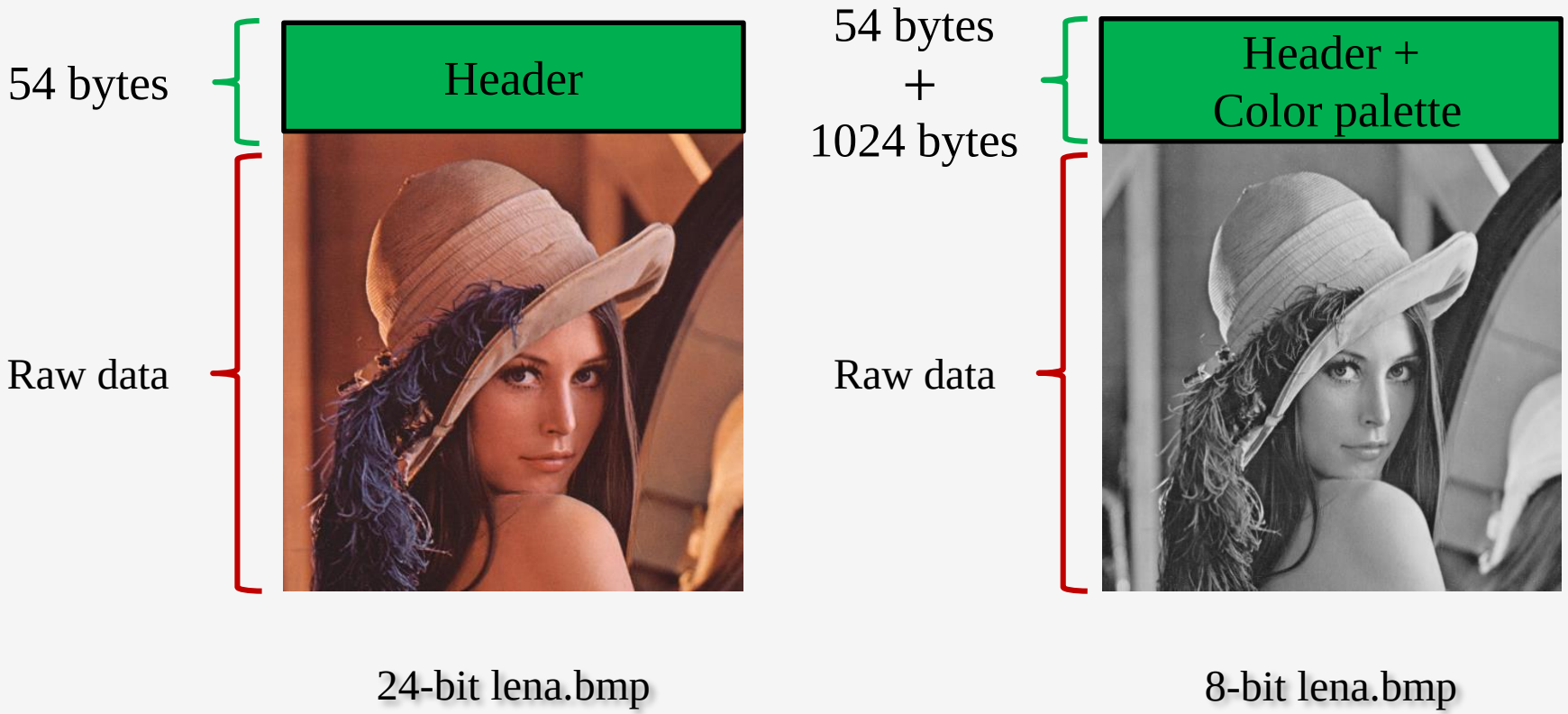
Introduction to Bitmap File (1/2)



Bitmap File Header	Size (bytes)
Identifier (ID)	2
File Size	4
Reserved	4
Bitmap Data Offset	4
Bitmap Info Header	
Bitmap Header Size	4
Width	4
Height	4
Planes	2
Bits Per Pixel	2
Compression	4
Bitmap Data Size	4
H-Resolution	4
V-Resolution	4
Used Colors	4
Important Colors	4
Color Table (Palette)	
Palette	N*4
Bitmap Array	
Bitmap Data	N/A

Figure:點陣圖（Bitmap）檔案格式:http://crazycat1130.pixnet.net/blog/post/1345538#mark-11

Introduction to Bitmap File (2/2)

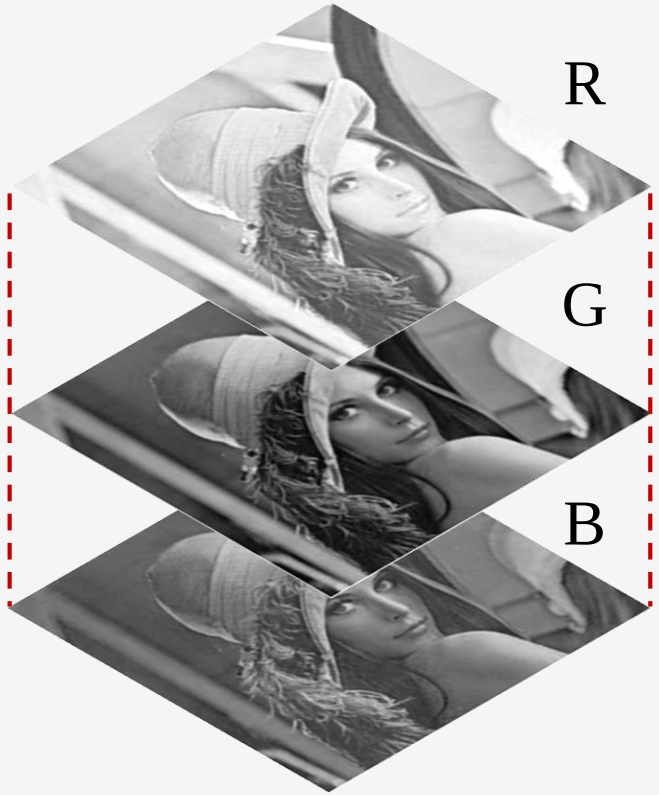


24-bit lena.bmp

8-bit lena.bmp

RGB to Gray-level

$$0.299 \times Red + 0.587 \times Green + 0.114 \times Blue = Y$$



Grading

- **Code & Demo (70%): Use the C/C++ only. Matlab or OpenCV is not allowed.**
  - 1-1) Extract header file (25%)
  - 1-2) Transform to gray-level image (15%)
  - 1-3) Calculate gray-level histogram (5%)
  - 1-4) Downsample the image and merge (20%)
  - 1-5) Calculate gray-level histogram (5%)
- **Report (30%):**
  - Flowchart (10%)
  - Experiment results (10%)
  - Discussions (10%)

Due Date & Demo Schedule

- **Demo Date**: Oct. 25 (Monday) or Oct. 26 (Tuesday)
- **Demo Time & Location**: 13:30 ~ 17:30 @E1-214-1
- The demo schedule will be announced at the TA webpage.
- You should compress your entire project (including .c/.cpp, .exe file, etc.) and report (.pdf) as a .zip file and submit to New ee-class before Oct. 25, 13:00.
- No delay. (If you have any special case, please inform us by sending an email early.)

Note

- Do it yourself!
- You will get a zero when you delay or fail to operation in demo (code and demo part), but you can still get points in report part.
- Everyone will be asked a few questions and operations when you are in demo. (Do not call for help.)
- The TA will use another image to test your code.
- If you have a notebook, please bring your own notebook. Otherwise, some people may not be able to execute the code during the demo.
- Remote connection/control is not allowed.

The details will be announced on our course website:
https://sites.google.com/view/ncuvclab/home/course/fall-2021-ta-dip?authuser=0

References

- Gonzalez, Rafael C., and Richard E. Woods, “Digital image processing,“ Prentice Hall, 2007.
- Test image “Building.bmp” download:

  https://drive.google.com/file/d/1pQMvrVuQn60R-P6zXYjjvz5j2-eKUrOv/view?usp=sharing