

SER 334 A Session

SI Session

Sunday, January 21st 2024

7:00 pm - 8:00 pm MST

Agenda



Macros

Function Parameters

BMP File Format

Reading Contents

Headers

SI Session Expectations

Thanks for coming to the **SER 334** SI session. We have a packed agenda and we are going to try to get through as many of our planned example problems as possible. This session will be recorded and shared with others.

- If after this you want to see additional examples, please visit the drop-in tutoring center.
- We will post the link in the chat now and at the end of the session.
 - tutoring.asu.edu
- Please keep in mind we are recording this session and it will be made available for you to review 24-48 hours after this session concludes.
- Finally, please be respectful to each other during the session.

Interact with us:

Zoom Features



Zoom Chat

- Use the chat feature to interact with the presenter and respond to presenter's questions.
- Annotations are encouraged

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Macros

Very helpful **BUT** we need to be *careful*

```
#define username "Katie"
#define PI 3.14
#define square(s) s*s

int main(){

    printf(format: "%s\n", username);
    printf(format: "%f\n", PI);
    printf(format: "%d\n", square(3));
    printf(format: "%d\n", square(3+7));

    return 0;
}
```

Katie
3.140000
9
31 ?

How can we solve this?

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Parameters

```
void funcOne(int n) {
```

```
void funcTwo(int *n) {
```

Both functions will
perform the same task

BUT there is a big
difference in
implementation

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Parameters

```
int r = 5;
printf(format: "Before Func One\n");
printf(format: "r: %d\n", r);
printf(format: "&r: %d\n", &r);
funcOne(n: r);
printf(format: "r: %d\n", r);
printf(format: "&r: %d\n", &r);
```

Standard Pass-By-Value, same as we have before.

```
void funcOne(int n) {
    printf(format: "FuncOne received: %d\n", n);
    printf(format: "FuncOne received &n: %d\n", &n);
    int x = n;
    n = 0;
    printf(format: "\tWithin FuncOne\n\tx: %d\n\tn: %d\n", x , n);
}
```

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Parameters

```
int r = 5;
printf( format: "Before Func One\n");
printf( format: "r: %d\n", r);
printf( format: "&r: %d\n", &r);
funcOne( n: r);
printf( format: "r: %d\n", r);
printf( format: "&r: %d\n", &r);
```

Standard Pass-By-Value, same as we have before.

Before Func One

r: 5

&r: 2084567436

FuncOne received: 5

FuncOne received &n:

Within FuncOne

x: 5

n: 0

r:

&r: 2084567436



```
void funcOne(int n) {
    printf( format: "FuncOne received: %d\n", n);
    printf( format: "FuncOne received &n: %d\n", &n);
    int x = n;
    n = 0;
    printf( format: "\tWithin FuncOne\n\tx: %d\n\tn: %d\n", x , n);
}
```

Will this be
the same
address as r?

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Parameters

Missing something here?



```
printf( format: "\nBefore Func Two\n");
int *s = (int*)malloc( Size: sizeof(int));
*s = 55;
printf( format: "s: %d\n", s);
printf( format: "*s: %d\n", *s);
printf( format: "&s: %d\n", &s);
printf( format: "&(*s): %d\n", &(*s));
funcTwo( n: s);
printf( format: "s: %d\n", *s);
printf( format: "&s: %d\n", &s);
```

0x5



0x88

s



```
void funcTwo(int *n) {
    printf( format: "FuncTwo received      n: %d\n", n);
    printf( format: "FuncTwo received      *n: %d\n", *n);
    printf( format: "FuncTwo received      &n: %d\n", &n);
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));
    int x = *n;
    *n = 0;
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);
}
```

Pass-By-Value, using a pointer.

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Parameters

```
printf( format: "\nBefore Func Two\n");
int *s = (int*)malloc( Size: sizeof(int));
*s = 55;
printf( format: "s: %d\n", s);
printf( format: "*s: %d\n", *s);
printf( format: "&s: %d\n", &s);
printf( format: "&(*s): %d\n", &(*s));
funcTwo( n: s);
printf( format: "s: %d\n", *s);
printf( format: "&s: %d\n", &s);
free( Memory: s);
```

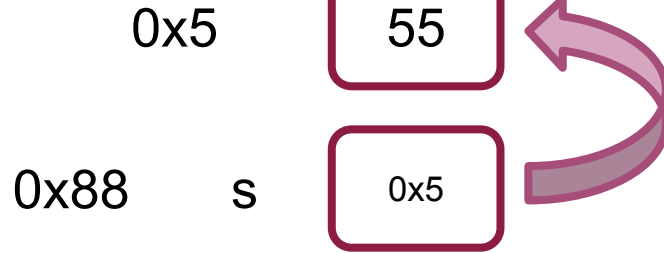
```
Before Func Two
s: -871623632
*s: 55
&s: 2084567424
&(*s): -871623632
```

```
void funcTwo(int *n) {
    printf( format: "FuncTwo received      n: %d\n", n);
    printf( format: "FuncTwo received      *n: %d\n", *n);
    printf( format: "FuncTwo received      &n: %d\n", &n);
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));
    int x = *n;
    *n = 0;
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);
}
```

Pass-By-Value, using a pointer.

SER 334

Parameters



Before Func Two

`s: -871623632`

`*s: 55`

`&s: 2084567424`

`&>(*s): -871623632`

```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received      n: %d\n", n);  
    printf( format: "FuncTwo received      *n: %d\n", *n);  
    printf( format: "FuncTwo received      &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);  
}
```

Pass-By-Value, using a pointer.

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Parameters

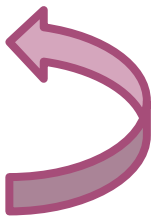
0x3632

55

0x7424

s

0x3632



Before Func Two

s: -871623632

*s: 55

&s: 2084567424

&(*s): -871623632

```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received      n: %d\n", n);  
    printf( format: "FuncTwo received      *n: %d\n", *n);  
    printf( format: "FuncTwo received      &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);  
}
```

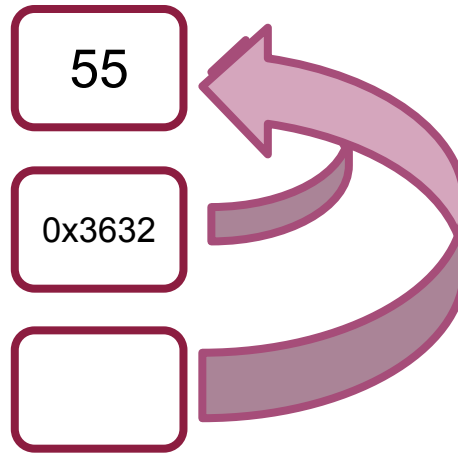
Pass-By-Value, using a pointer.

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Parameters

0x3632
0x7424 s

n



```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received      n: %d\n", n);  
    printf( format: "FuncTwo received      *n: %d\n", *n);  
    printf( format: "FuncTwo received      &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);  
}
```

Pass-By-Value, using a pointer.

Before Func Two

s: -871623632

*s: 55

&s: 2084567424

&(*s): -871623632

FuncTwo received n: -871623632

FuncTwo received *n: 55

FuncTwo received &n: 2084567376

FuncTwo received &(*n): -871623632

Within FuncTwo

x: 55

n: 0

s: 0

&s: 2084567424

SER 334

Parameters

Sent the
location of the
variable!

```
printf( format: "\nBefore Func Two Run Two\n");  
int t = 55;  
printf( format: "t: %d\n", t);  
printf( format: "&t: %d\n", &t);  
funcTwo( n: &t);  
printf( format: "t: %d\n", t);  
printf( format: "&t: %d\n", &t);
```

Before Func Two Run Two
t: 55
&t: 2084567420

Also notice that
we are using a
normal int and
not a pointer!

```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received      n: %d\n", n);  
    printf( format: "FuncTwo received      *n: %d\n", *n);  
    printf( format: "FuncTwo received      &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\ttx: %d\n\tn: %d\n", x , *n);  
}
```

Same Function, but **Pass-By-Reference**

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Parameters

Sent the *location* of the variable!

```
printf( format: "\nBefore Func Two Run Two\n");  
  
int t = 55;  
  
printf( format: "t: %d\n", t);  
printf( format: "&t: %d\n", &t);  
  
funcTwo( n: &t);  
  
printf( format: "t: %d\n", t);  
printf( format: "&t: %d\n", &t);
```

Before Func Two Run Two
t: 55
&t: 2084567420

```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received      n: %d\n", n);  
    printf( format: "FuncTwo received      *n: %d\n", *n);  
    printf( format: "FuncTwo received      &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);  
}
```

t

SER 334

Parameters

Sent the *location* of the variable!

```
printf( format: "\nBefore Func Two Run Two\n");  
int t = 55;  
printf( format: "t: %d\n", t);  
printf( format: "&t: %d\n", &t);  
funcTwo( n: &t);  
printf( format: "t: %d\n", t);  
printf( format: "&t: %d\n", &t);
```

Before Func Two Run Two

t: 55

&t: 2084567420

FuncTwo received n: 2084567420

FuncTwo received *n: 55

FuncTwo received &n: 2084567376

FuncTwo received &(*n): 2084567420

Within FuncTwo

x: 55

n: 0

t: 0

&t: 2084567420

```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received n: %d\n", n);  
    printf( format: "FuncTwo received *n: %d\n", *n);  
    printf( format: "FuncTwo received &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n",  
};
```

0x7420

t

55

n

SER 334

Parameters

Sent the
location of
variable!

What about sending *the location* of
a pointer? Any ideas?

```
void funcTwo(  
    int x  
    *n =  
    print
```

```
printf( format: "\nBefore Func Two Run Three\n");  
int *u = (int*)malloc( Size: sizeof(int));  
*u = 77;  
printf( format: "u: %d\n", u);  
printf( format: "*u: %d\n", *u);  
printf( format: "&u: %d\n", &u);  
printf( format: "&(*u): %d\n", &(*u));  
funcTwo( n: &u);  
printf( format: "u: %d\n", u);  
printf( format: "ut: %d\n", &u);  
free( Memory: u);
```



```
Before Func  
t: 55  
&t: 2084  
FuncTwo  
FuncTwo  
FuncTwo re  
FuncTwo rece  
Within  
x: 55  
n: 0
```

```
t: 0  
&t: 2084567420
```

0x7420

t

55

0x7376

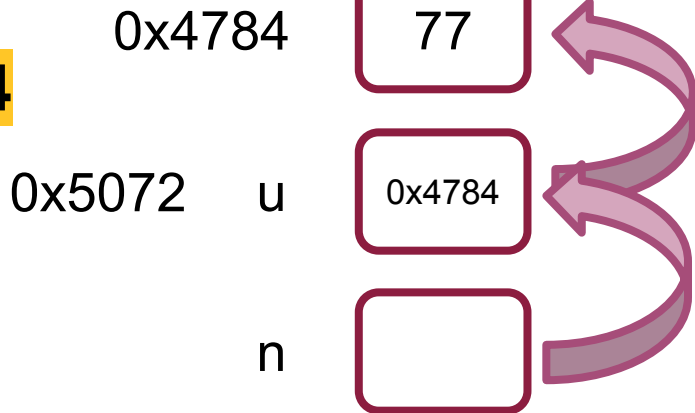
n

0x7420



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Parameters



```
void funcTwo(int *n) {  
    printf( format: "FuncTwo received      n: %d\n", n);  
    printf( format: "FuncTwo received      *n: %d\n", *n);  
    printf( format: "FuncTwo received      &n: %d\n", &n);  
    printf( format: "FuncTwo received &(*n): %d\n", &(*n));  
    int x = *n;  
    *n = 0;  
    printf( format: "\tWithin FuncTwo\n\tx: %d\n\tn: %d\n", x , *n);  
}
```

Pointer to a pointer - we don't have the value!

Before Func Two Run Three

u: -1750264784

*u: 77

&u: -77595072

&(*u): -1750264784

FuncTwo received n: -77595072

FuncTwo received *n: -1750264784

FuncTwo received &n: -77595104

FuncTwo received &(*n): -77595072

Within FuncTwo

x: -1750264784

n: 0

u: 0

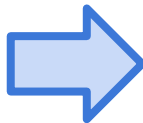
ut: -77595072

SER 334

Parameters

Summary

```
void funcOne(int n) {
```



Makes a local copy

```
void funcTwo(int *n) {
```



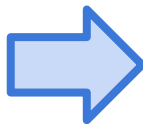
Makes a pointer

SER 334

Parameters

Summary

```
void funcOne(int n) {
```



Makes a local copy

One pointer exists outside of funcTwo, one pointer exists within funcTwo

```
void funcTwo(int *n) {
```



Integer exists outside of funcTwo, the pointer exists within funcTwo

Makes a new pointer, that is pointing to the same address as the parameter

??

Makes a new pointer, that is pointing to the same address as the parameter

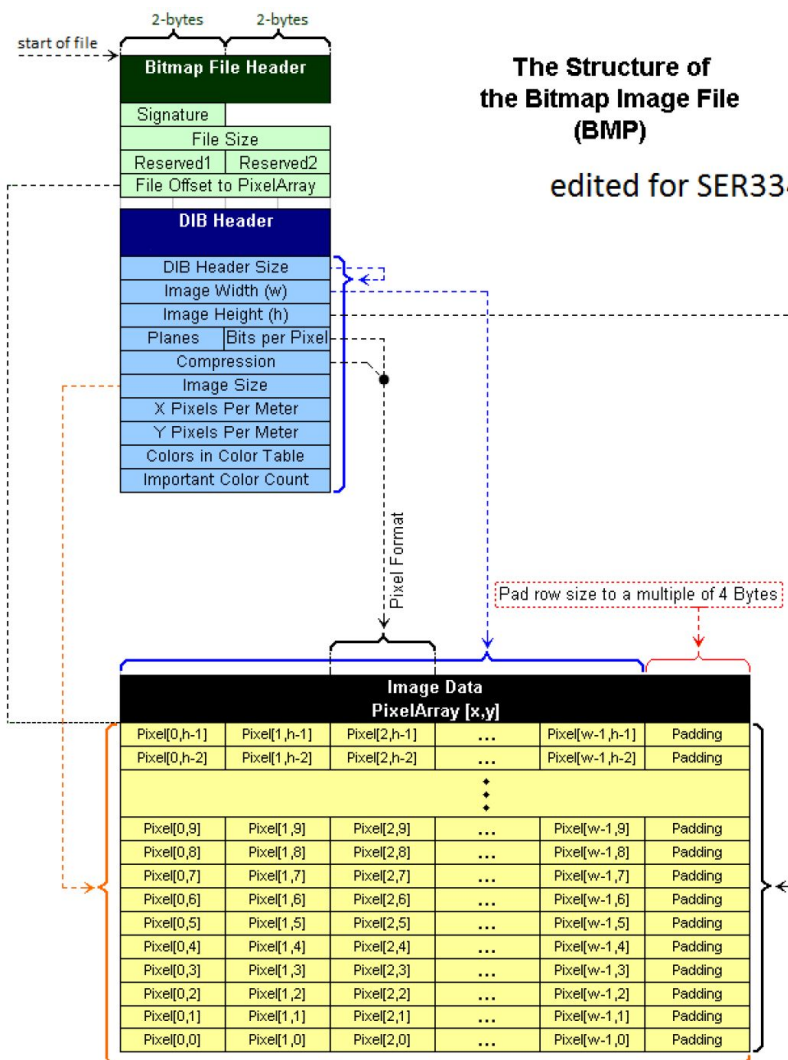
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BMP Format

The Structure of the Bitmap Image File (BMP)

edited for SER334

[BMP Header Starter Code](#)



SER 334 BMP Format

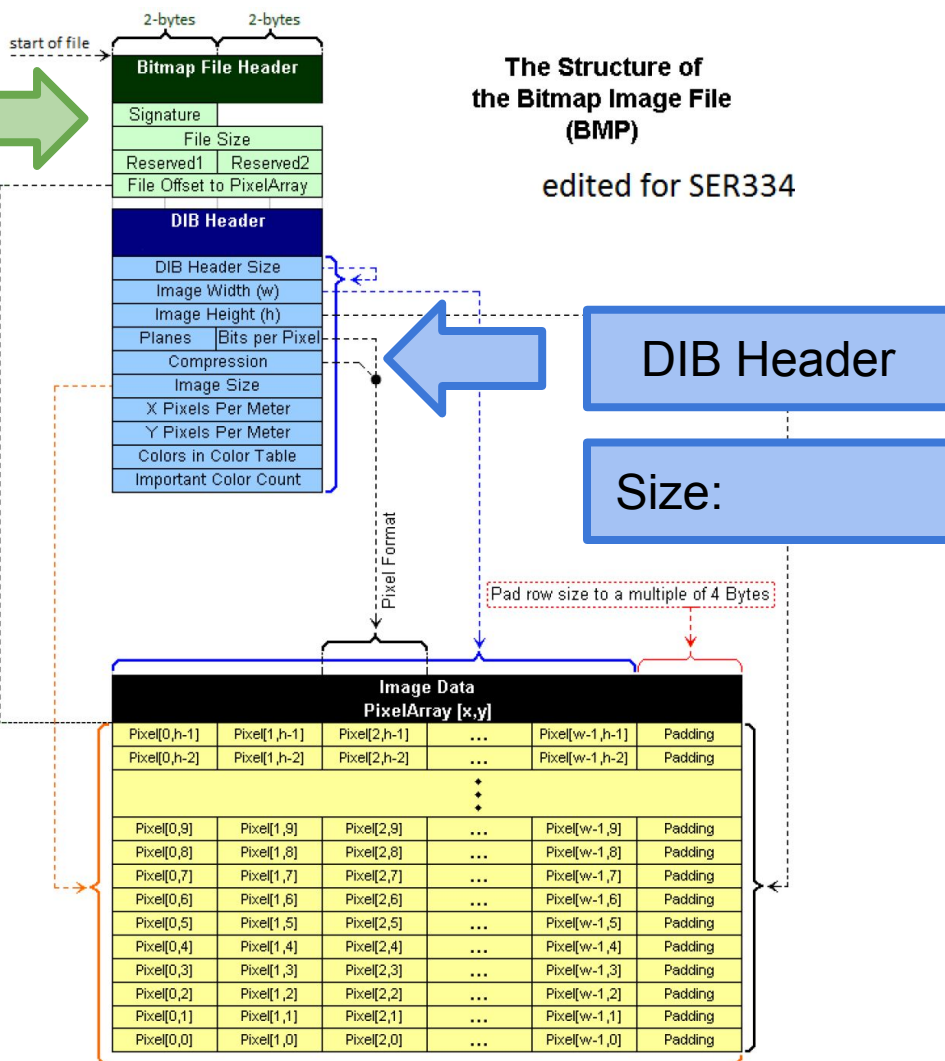
BMP Header

Size:

The Structure of the Bitmap Image File (BMP)

edited for SER334

[BMP Header Starter Code](#)

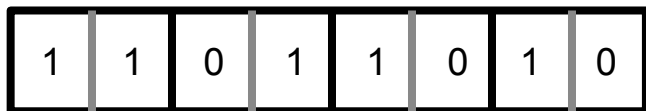


SER 334

BMP File Format

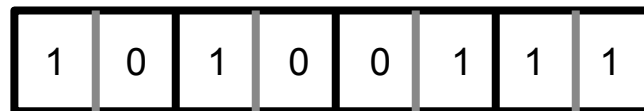
Remember to account for Endianness!

Big Endian **HEX**



Read L → R

Little Endian **HEX**



Read R → L

Decimal: 285, 282, 320

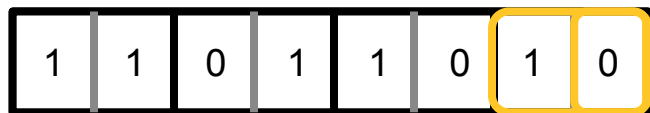
Binary: 0001 0001 0000 0001 0001 0000 0001 0000

SER 334

BMP File Format

Remember to account for Endianness!

Big Endian **HEX**

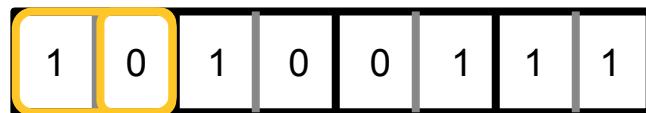


Read L → R

What is the size of
this section?

1 byte

Little Endian **HEX**



Read R → L

Decimal: 285, 282, 320

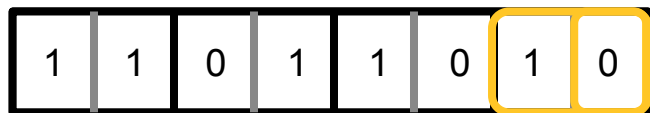
Binary: 0001 0001 0000 0001 0001 0000 0001 0000

SER 334

BMP File Format

Remember to account for Endianness!

Big Endian **HEX**

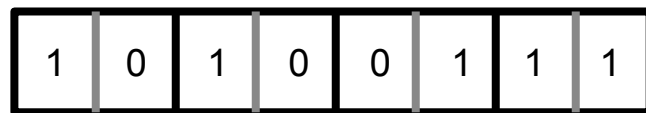


Read L → R

What is the size of
this section?

1 byte

Little Endian **HEX**



Read R → L

Decimal: 285, 282, 320

Binary: 0001 0001 0000 0001 0001 0000 0001 0000

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T S O N U L N U L N U L 6 N U L N U L} (
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T B S O N U L N U L N U L N U L 6 N U L N U L (}
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T B S O N U L N U L N U L N U L 6 N U L N U L} (
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

[illegible]

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BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^E _T S ^O _H N ^N _U N ^N _U N ^N _U N ^N _U L ^L _L L ^L _L L ^L _L L ^L _L 6 ^N _U L ^N _U L ^L _L (
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N ^N _U L ^N _U L ^L _L ? N ^N _U L ^N _U L ^L _L ? N ^N _U L ^N _U L ^L _L S ^O _H N ^C _A N ^L _L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N ^N _U L ^N _U L ^L _L N ^N _U L ^N _U L ^L _L N ^N _U L ^N _U L ^L _L ? S ^S _U L ^L _L ? S ^S _U L ^L _L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N ^N _U L ^N _U L ^L _L N ^N _U L ^N _U L ^L _L N ^N _U L ^N _U L ^L _L N ^N _U L ^N _U L ^L _L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T B S O N U L N U L N U L N U L} 6 ^{N U L N U L} (
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	^{N U L N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L}
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	^{N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L}
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	^{N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?}
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	^{? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?}

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BMP File Format

What is this piece?

[illegible]

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T B S O N U L N U L N U L 6 N U L N U L} (
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T B S O N U L N U L N U L N U L 6 N U L N U L (}
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	
00000	42	4D	56	17	01	00	00	00	00	00	36	00	00	00	28	BMV ^{E T B S O N U L N U L N U L 6 N U L N U L (}
0000F	00	00	00	9A	00	00	00	9A	00	00	00	01	00	18	00	N U L N U L ? N U L N U L ? N U L N U L S O H C A N U L
0001E	00	00	00	00	00	00	00	00	C4	0E	00	00	C4	0E	00	N U L N U L N U L N U L N U L N U L ? S N U L N U L ? S N U L
0002D	00	00	00	00	00	00	00	00	00	FF	FE	FF	FF	FE	FF	N U L N U L N U L N U L N U L N U L N U L ? ? ? ? ? ?
0003C	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0004B	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0005A	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00069	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00078	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00087	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
00096	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	FF	FE	FF	? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

BMP File Format

What is this piece?

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BMP File Format

What is this piece?

[illegible]

BMP File Format

What is this piece?

[illegible]

BMP File Format

What is this piece?

[illegible]

Upcoming Events

SI Sessions:

- Monday, January 22nd at 7:00 pm MST
- Sunday, January 28th at 7:00 pm MST **Cancelled - good luck on Exam 1!**
- Monday, January 29th at 7:00 pm MST

Review Sessions:

- Exam 1 Review: Thursday, January 25th 7:00 pm - 9:00 pm MST

Questions?

Survey:

<http://bit.ly/ASN2324>



More Questions?

Check out our other resources!

tutoring.asu.edu



Academic Support

Academic Support Network (ASN) provides a variety of free services in-person and online to help currently enrolled ASU students succeed academically.

Services



Subject Area Tutoring

Need in-person or online help with math, science, business, or engineering courses? Just hop into our Zoom room or drop into a center for small group tutoring. We'll take it from there.

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[View the tutoring schedule](#)

[View digital resources](#)

Go to Zoom



Writing Tutoring

Need help with undergraduate or graduate writing assignments? Schedule an in-person or online appointment, access your appointment link, or wait in our drop-in queue.

[Access your appointment link](#)

[Access the drop-in queue](#)

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1-

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2-

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[View digital resources](#)



1. Click on 'Go to Zoom' to log onto our Online Tutoring Center.
2. Click on 'View the tutoring schedule' to see when tutors are available for specific courses.

More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub

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Online Study Hub

Online peer communities for students and tutors, YouTube channels, and Tutorbots.



What are online peer communities?

Individual courses have an online peer community that allows you to connect with your peers to post and answer questions and to develop study groups.



How can tutoring center videos help?

Videos can help supplement the learning you're doing in and outside of class and include step-by-step methods for how to understand concepts.



How does the Tutorbot work?

You can ask the Tutorbot questions about course concepts and the Tutorbot will recommend additional resources and examples to help address your questions.

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Business

ACC 231

Uses of Accounting Info I

 [Peer Community](#)

ACC 241

Uses of Accounting Info II

 [Peer Community](#)

CIS 105

Computer Applications and Information Technology

 [Peer Community](#)

Don't forget to check out the Online Study Hub for additional resources!

Additional Resources

- [Course Repo](#)
- [BMP File Format \(Wiki\)](#)
- [Linux Kernel API](#)