

User-Defined Types II

CIS 308
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User-Defined Types

- **Enumeration Type**
 - Allows *identifiers* to be used as *values*
 - May improve clarity
 - 1, 2, 3, ..., 11, 12
 - Jan, Feb, Mar,..., Nov, Dec

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User-Defined Types

- Defining

```
enum typeName{
    value1,
    value2,
    ...
} e1, e2,...;
```

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User-Defined Types

- Defining

```
enum typeName{
    value1,
    value2,
    ...
} e1, e2, ...;
```

```
enum medal {
    goal,
    silver,
    bronze
} a_medal;
```

```
enum medal medal_100m;
```

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User-Defined Types

- Defining

```
enum typeName{
    value1,
    value2,
    ...
} e1, e2, ...;
```

```
enum medal {
    goal,
    silver,
    bronze
} a_medal;

enum medal medal_100m;

Medal_100m = gold;
```

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User-Defined Types

- Defining

```
enum typeName{
    value1,
    value2,
    ...
} e1, e2, ...;
```

```
enum boolean{
    false,
    true,
};

enum boolean flag;

flag = true;

if(flag == true) {...}
```

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User-Defined Types

- Defining

```
enum typeName{
    value1,
    value2,
    ...
} e1, e2, ...;
```

```
enum grade{
    freshman = 9,
    sophomore, junior,
    senior
};

enum grade class;

class = freshman;

class = 10 // same as ?
```

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Option 1

```
enum grade {freshman = 9, sophomore, junior,
senior};
```

```
struct student {
    char name[20];
    enum grade class;
};
```

Option 2

```
struct student {
    char name[20];
    enum grade {freshman = 9, sophomore,
junior, senior} class;
};
```

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User-Defined Types

Option 3

```
typedef enum {freshman = 9, sophomore, junior,
senior} SchoolYear;

struct student {
    char name[20];
    SchoolYear class;
};
```

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User-Defined Types

```
struct student {
    char name[20];
    SchoolYear class;
};

struct student mary;

strcpy(mary.name, "Mary");
mary.class = junior;
```

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User-Defined Types

```
typedef struct student {
    char name[20];
    SchoolYear class;
} Student;

Student mary;

strcpy(mary.name, "Mary");
mary.class = junior;
```

- Enumeration variables are treated by the C language as variables of type `int`

```
enum day {Monday, Tuesday, Wednesday};
Tuesday + Wednesday;
```

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User-Defined Types

Union

```
union modelName{
    type1 name1;
    type2 name2;
    ...
    typeN nameN;
} varList;
```

```
union money {
    double dollars;
    int yen;
} price;
```

```
union money price2;
```

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User-Defined Types

```
union money {
    double dollars;
    int    yen;
};

union money cost;

cost.yen = 17;

cost.dollars = 4.20;

printf("Yens: %d\n", cost.yen);
```

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User-Defined Types

```
union money {
    double dollars;
    int    yen;
};

union money cost;

cost.yen = 17;

cost.dollars = 4.20;

printf("Yens: %d\n", cost.yen);
```

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User-Defined Types

```
union money {
    double dollars;
    int    yen;
};
enum currencyK {dollarsK, yenK}
enum currencyK presentCurrency;
union money cost;

cost.yen    = 17;
presentCurrency = yenK

if(presentCurrency == yenK) {
    printf("Yens %d\n", cost.yen);
}
else if (presentCurrency == dollarsK) {
    printf(("Dollars %f\n", cost.dollars);
}

```

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User-Defined Types

```
typedef struct person {
    char name[20];
    int age;

    union {
        struct {
            char major[20];
            double gpa;
        } student;
        struct {
            char division[20];
            int yearsWorked;
        } employee;
    } kind;

    enum {employeeK, studentK} typeK;
} Person;
```

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User-Defined Types

```
typedef struct person {
    char name[20];
    int age;

    union {
        struct {
            char major[20];
            double gpa;
        } student;
        struct {
            char division[20];
            int yearsWorked;
        } employee;
    } kind;

    enum {employeeK, studentK} typeK;
} Person;
```

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User-Defined Types

```
Person p1;
Person* ptrPerson;

// We want a person named Bob, 35yo, employee for
// the last 2 years in the Legal Department


strcpy(p1.name "Bob");
p1.age = 35;
strcpy(p1.kind.employee.division, "Legal");
p1.kind.employee.yearsworked = 2;
p1.typeK = employeeK;

// Run program
```

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User-Defined Types

Lab Activity

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