AVR 프로그래밍

7강

정보컴퓨터공학과 권혁동

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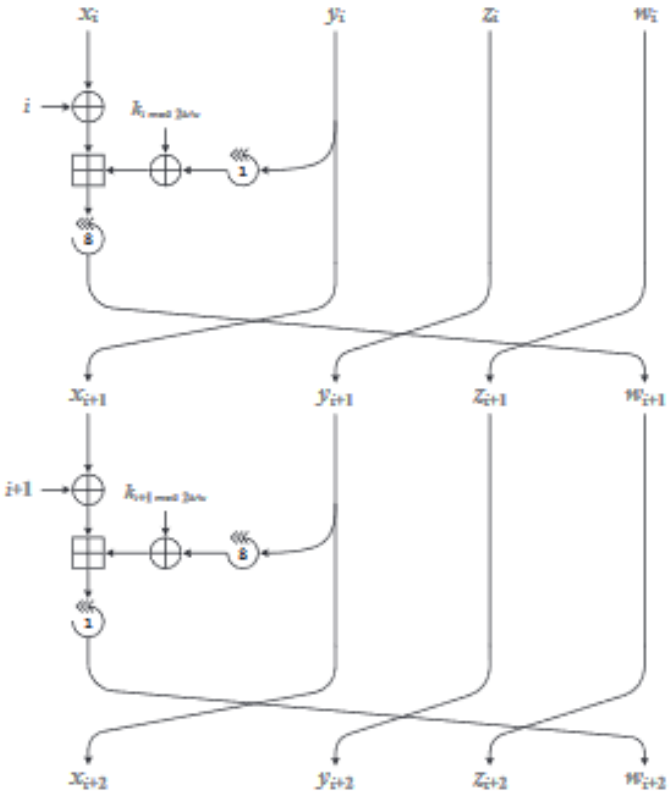
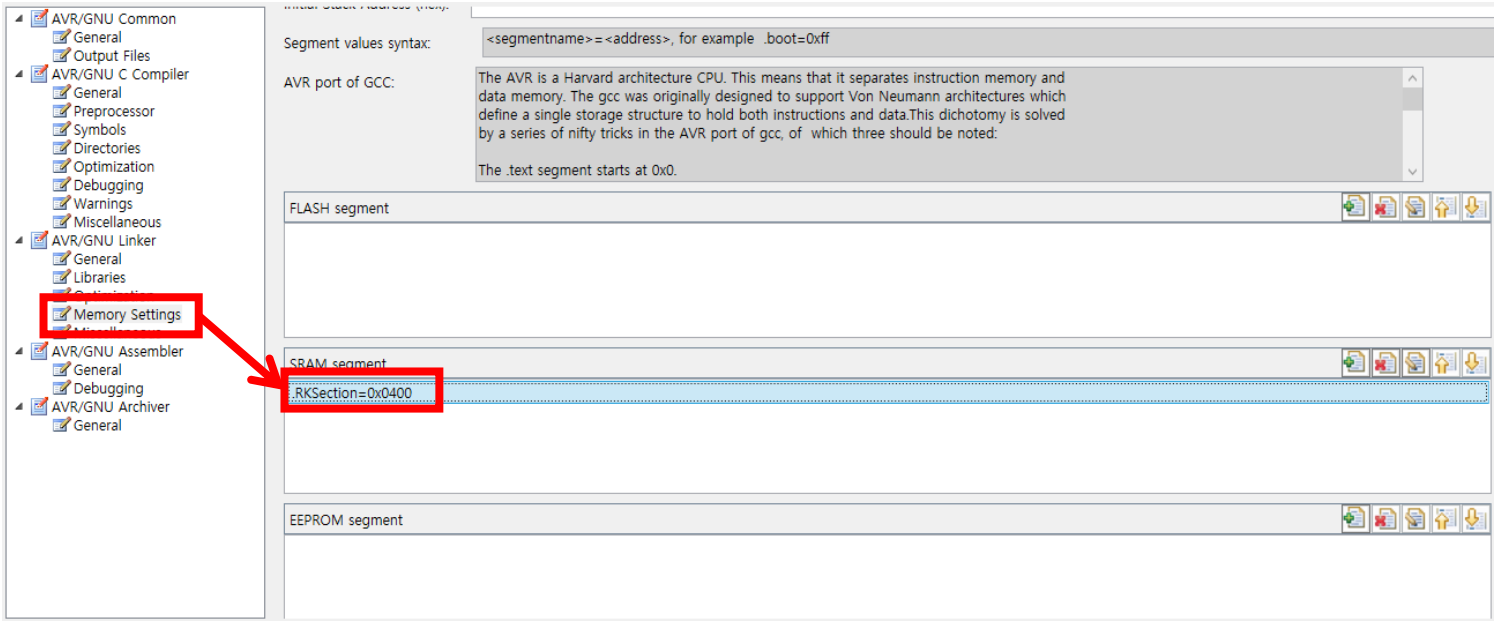
CHAM 알고리즘 구현

- 지금까지 배운 기법을 기반으로 CHAM을 구현
- CHAM-64/128을 구현
- ARX 구조 알고리즘
- 88라운드를 반복
- 다음 테스트 벡터를 사용
  - RK: 0x0301, 0x0705, 0x0b09, 0x0f0d, 0x1311, 0x1715, 0x1b19, 0x1f1d, 0x151e, 0x0308, 0x3932, 0x2f24, 0x4d46, 0x5b50, 0x616a, 0x777c
  - PT: 0x1100, 0x3322, 0x5544, 0x7766
  - CT: 0x6579 0x1204 0x123f 0xe5a9



CHAM 알고리즘 구현

```
u16 rk[16] __attribute__ ((section(".RKSection"))) = {0x0301, 0x0705, 0x0b09, 0x0f0d, 0x1311, 0x1715, 0x1b19, 0x1f1d, 0x151e, 0x0308, 0x3932, 0x2f24, 0x4d46, 0x5b50, 0x616a, 0x777c};
u16 pt[4] = {0x1100, 0x3322, 0x5544, 0x7766};
// CT = 0x6579 0x1204 0x123f 0xe5a9
```



- 변수 선언
  - 메모리 특정 지점에 변수를 생성하기 위해서는 **전역변수**로 선언

CHAM 알고리즘 구현

- 레지스터 이름 설정
- 전체 암호와 알고리즘 구조
  - 빨강: 스택 관리
  - 파랑: 로드, 스토어
  - 초록: 라운드 함수

```
#define X00 R18
#define X01 R19
#define X10 R20
#define X11 R21
#define X20 R22
#define X21 R23
#define X30 R24
#define X31 R25

#define TM0 R26
#define TM1 R27

#define RC R29
#define RK R0

#define CNT R28
```

```
PUSH R28
PUSH R29

MOVW R26, R24
MOVW R30, R22
```

```
LD X00, X+
LD X01, X+
LD X10, X+
LD X11, X+
LD X20, X+
LD X21, X+
LD X30, X+
LD X31, X+
```

```
PUSH R26
PUSH R27

CLR RC
LDI CNT, 88
```

```
LOOP:
ANDI R30, 31
ODD_ROUND
EVEN_ROUND

CPSE RC, CNT
RJMP LOOP
```

```
POP R27
POP R26
```

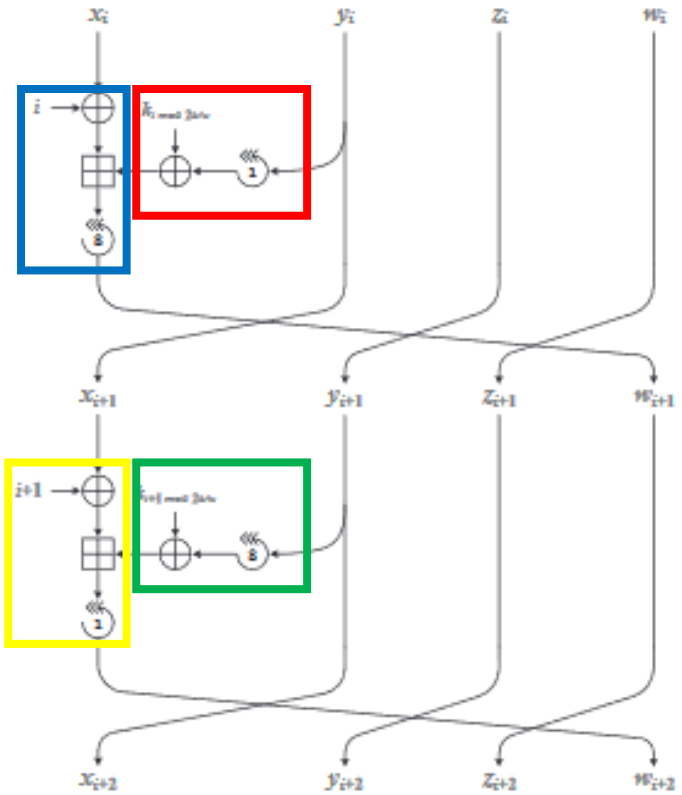
```
ST -X, X31
ST -X, X30
ST -X, X21
ST -X, X20
ST -X, X11
ST -X, X10
ST -X, X01
ST -X, X00
```

```
POP R29
POP R28


RET
```

CHAM 알고리즘 구현

- 홀수 라운드와 짝수 라운드



```
.macro ODD_ROUND
    MOVW TM0, X10

    LSL TM0
    ROL TM1
    ADC TM0, R1

    LD RK, Z+
    EOR TM0, RK
    LD RK, Z+
    EOR TM1, RK

    EOR X00, RC

    ADD X00, TM0
    ADC X01, TM1

    MOV TM0, X00
    MOV X00, X01
    MOV X01, TM0

    MOVW TM0, X00
    MOVW X00, X10
    MOVW X10, X20
    MOVW X20, X30
    MOVW X30, TM0

    INC RC

.endm
```

```
.macro EVEN_ROUND
    MOV TM0, X11
    MOV TM1, X10

    LD RK, Z+
    EOR TM0, RK
    LD RK, Z+
    EOR TM1, RK

    EOR X00, RC

    ADD X00, TM0
    ADC X01, TM1

    LSL X00
    ROL X01
    ADC X00, R1

    MOVW TM0, X00
    MOVW X00, X10
    MOVW X10, X20
    MOVW X20, X30
    MOVW X30, TM0

    INC RC
.endm
```

Q & A