

Project #7(Pjt07_uart_input_cir_queue)

◆ UART0 RX(input queue)

```
char qi[QI_SIZE], qo[QO_SIZE];  
int  fi, ri, fo, ro;
```

```
void q_init()  
{  
    fi = ri = fo = ro = 0;  
}
```

```
int qi_insert(char ch)  
{  
    if ((ri + 1) % QI_SIZE == fi)  
        return(0);    // full  
    ri = (ri + 1) % QI_SIZE;  
    qi[ri] = ch;  
    return(1);  
}
```

```
int qi_delete()  
{  
    if (ri == fi)  
        return(0);    // empty  
    fi = (fi + 1) % QI_SIZE;  
    return(qi[fi]);  
}
```

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◆ UART0 RX(input queue)

```
int  qo_insert(char ch)
{
    if ((ro + 1) % QO_SIZE == fo)
        return(0);    // full
    ro = (ro + 1) % QO_SIZE;
    qo[ro] = ch;
    return(1);
}
```

```
int  qo_delete()
{
    if (ro == fo)
        return(0);    // empty
    fo = (fo + 1) % QO_SIZE;
    return(qo[fo]);
}
```

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◆ UART0 RX(input queue)

```
#include <stdio.h>
#include <avr/io.h>
#include <compat/deprecated.h>
int  uart_putchar(char ch, FILE *stream);

FILE Mystdout = FDEV_SETUP_STREAM(uart_putchar, NULL, _FDEV_SETUP_WRITE);
uchar  uart_busy;

void  uart_init()
{
    stdout = &Mystdout;
    q_init();
    uart_busy = 0;                // false

    UBRR0H = 0x00; UBRR0L = 0x07; // 115.2Kbps
    sbi(UCSR0A, U2X0);           // 115.2Kbps
    sbi(UCSR0B, TXEN0);          // TX enable
    sbi(UCSR0B, TXCIE0);         // TX complete interrupt enable
    sbi(UCSR0B, RXEN0);          // RX enable
    sbi(UCSR0B, RXCIE0);         // RX complete interrupt enable
}
```

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◆ Setup Console Device Driver with UART0(Output)

```
#include <stdio.h>
#include <avr/io.h>
int  uart_putchar(char ch, FILE *stream)
{
    if (ch == '\n') uart_putchar('r', stream);
    cli();
    if (!uart_busy) {
        UDR0 = ch;
        uart_busy = 1;
    }
    else {
        while(qo_insert(ch) == 0) {
            sei();
            _delay_us(100);
            cli();
        }
    }
    sei();
    return(1);
}
```

```
#include <avr/interrupt.h>
ISR(USART0_TX_vect)
{
    char  ch;

    if ((ch = qo_delete()) == 0)
        uart_busy = 0;
    else
        UDR0 = ch;
}
```

```
#include <avr/interrupt.h>
ISR(USART0_RX_vect)
{
    char  ch;

    ch = UDR0;
    qi_insert(ch);
}
```

Project #7(Pjt07_uart_input_cir_queue)

```
main()
{
    char  cmd[128], ch;
    int   n = 0;

    uart_init();
    sei();
    printf( "$ " );
    while(1) {
        cli();
        ch = qi_delete();
        sei();
        if (ch) {
            if (ch == 'Wr' ) continue;
            if (ch == 'Wn' ) {
                cmd[n] = 0;
                if (!strcmp(cmd, "app" )) app_prime(2000);
                else
                    printf( "Merong...Wn" );
                n = 0;
                printf( "$ ");
            }
            else
                cmd[n++] = ch;
        }
    }
}
```

