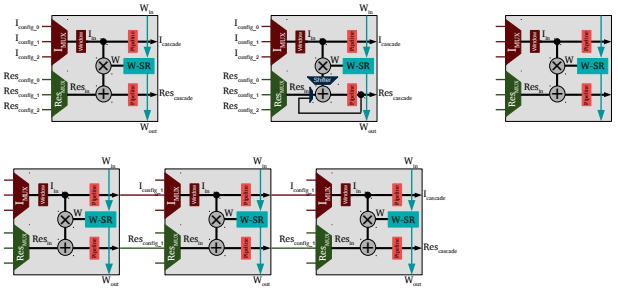
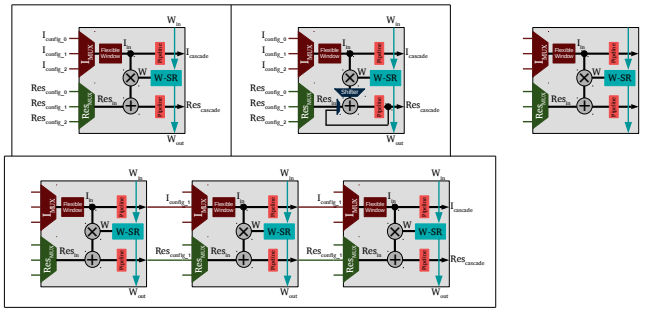
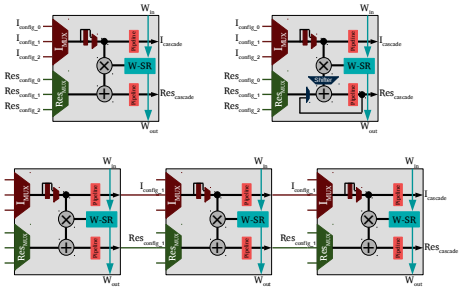
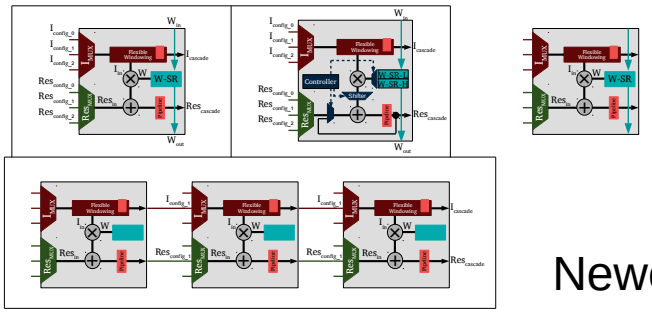
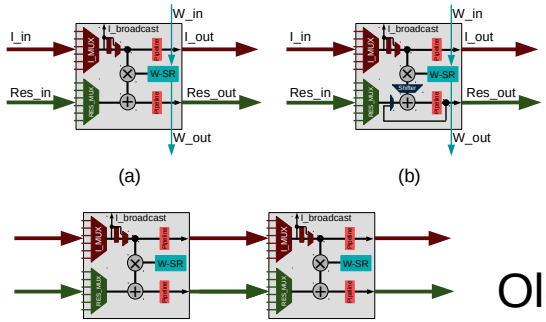
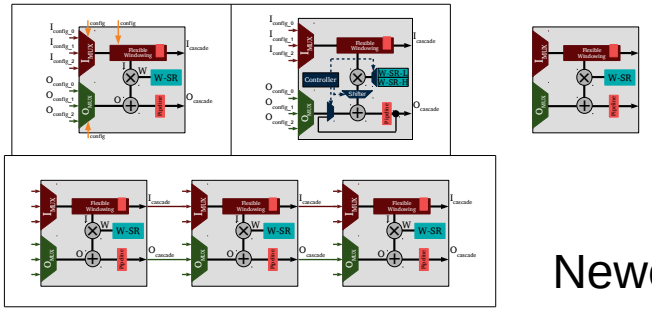

New


Newer


Old

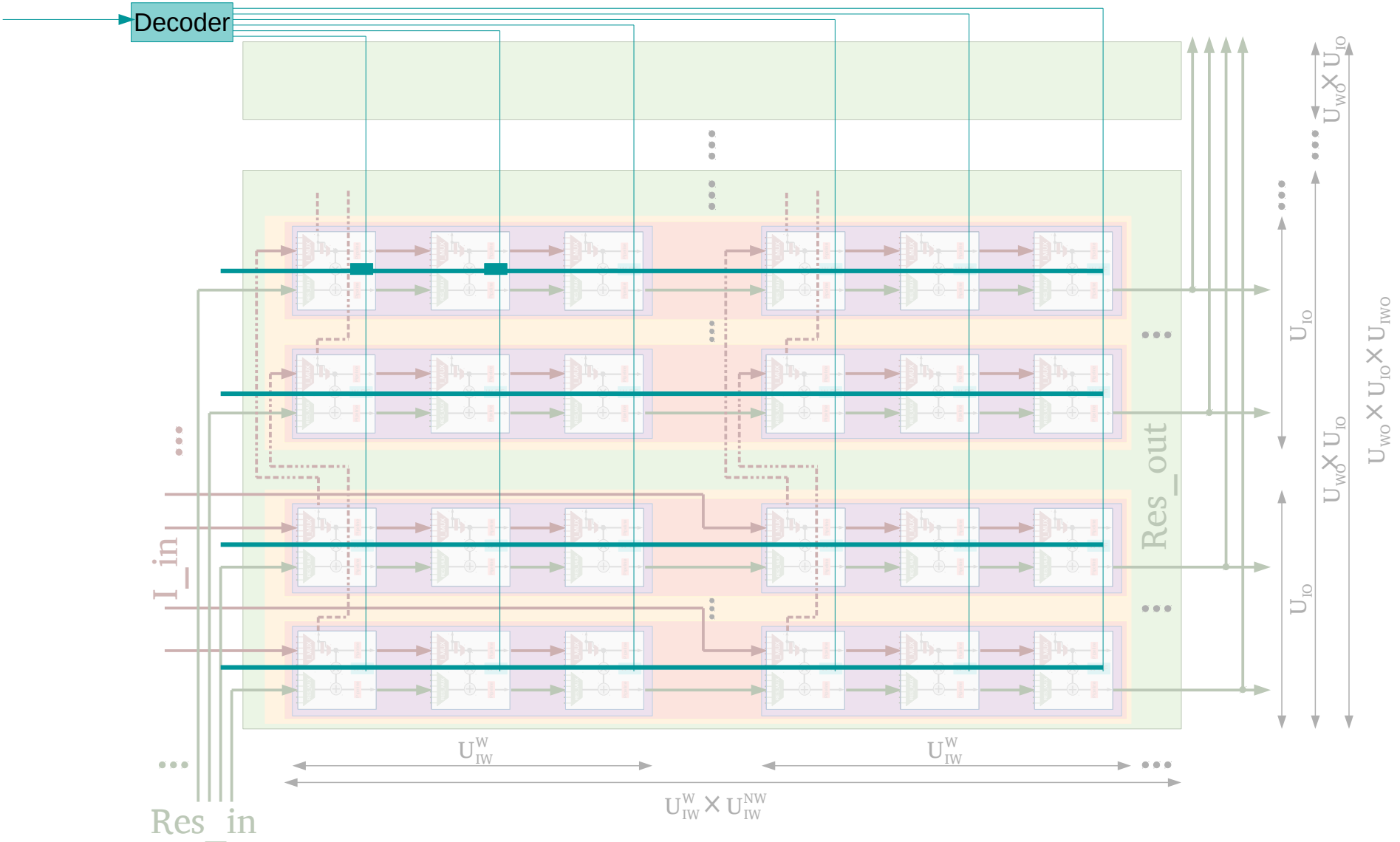

Newest


Older

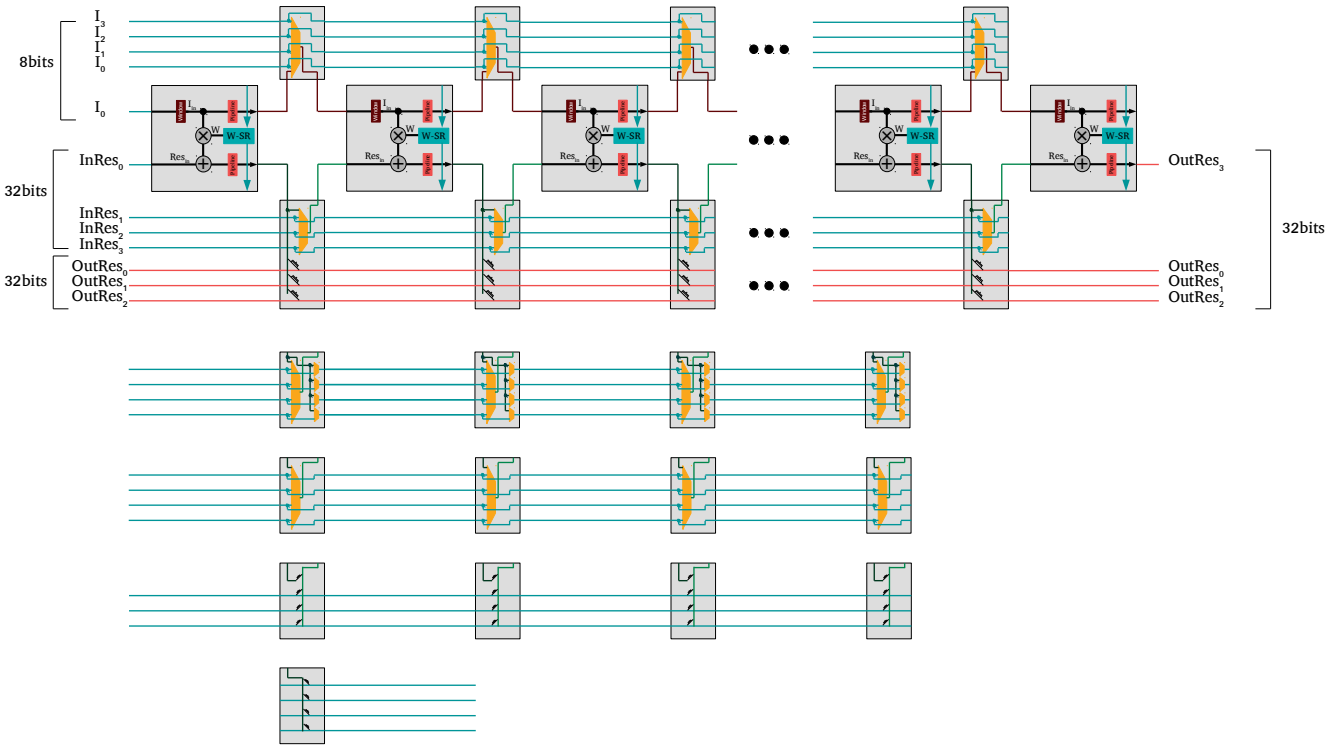

Newest2

I_in
Res_in
Res_out
W-RF
U_{IW}^{W}
$U_{IW}^{W} \times U_{IW}^{NW}$
U_{IO}
$U_{WO} \times U_{IO}$
$U_{WO} \times U_{IO} \times U_{IWO}$

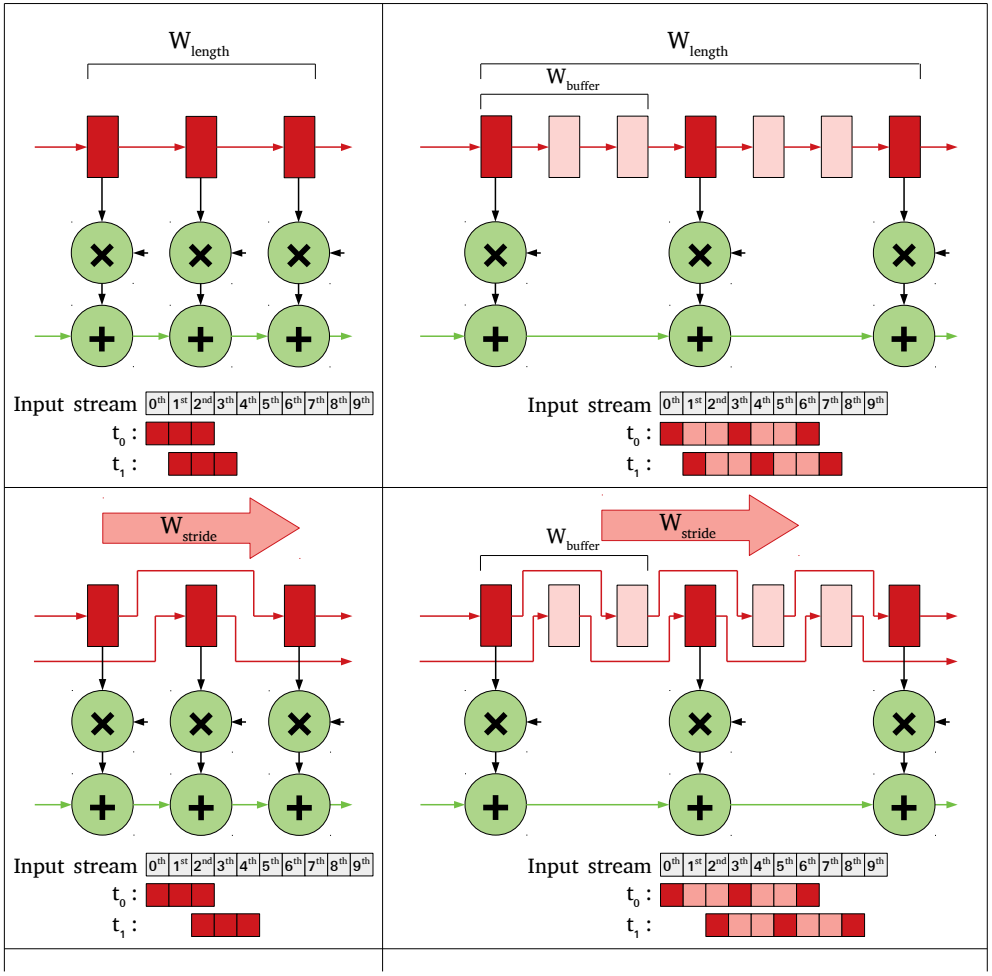
I_{in}
O_{in}
O_{out}
U_{IW}^{W}
U_{IW}^{W}
$U_{IW}^{W} \times U_{IW}^{NW}$
U_{IO}
U_{IO}
$U_{WO} \times U_{IO}$
$U_{WO} \times U_{IO}$
$U_{WO} \times U_{IO} \times U_{IWO}$


Decoder
I_in
Res_in
Res_out
U_{IW}^{W}
U_{IW}^{W}
$U_{IW}^{W} \times U_{IW}^{NW}$
U_{IO}
U_{IO}
$U_{WO} \times U_{IO}$
$U_{WO} \times U_{IO}$
$U_{WO} \times U_{IO} \times U_{IWO}$

1D Super Flex arch.



Windowed param: fx (filter

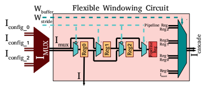


Iteration step may affects:
1- window size
2- speed of windowing
3- sample rate (dilated convolutions)

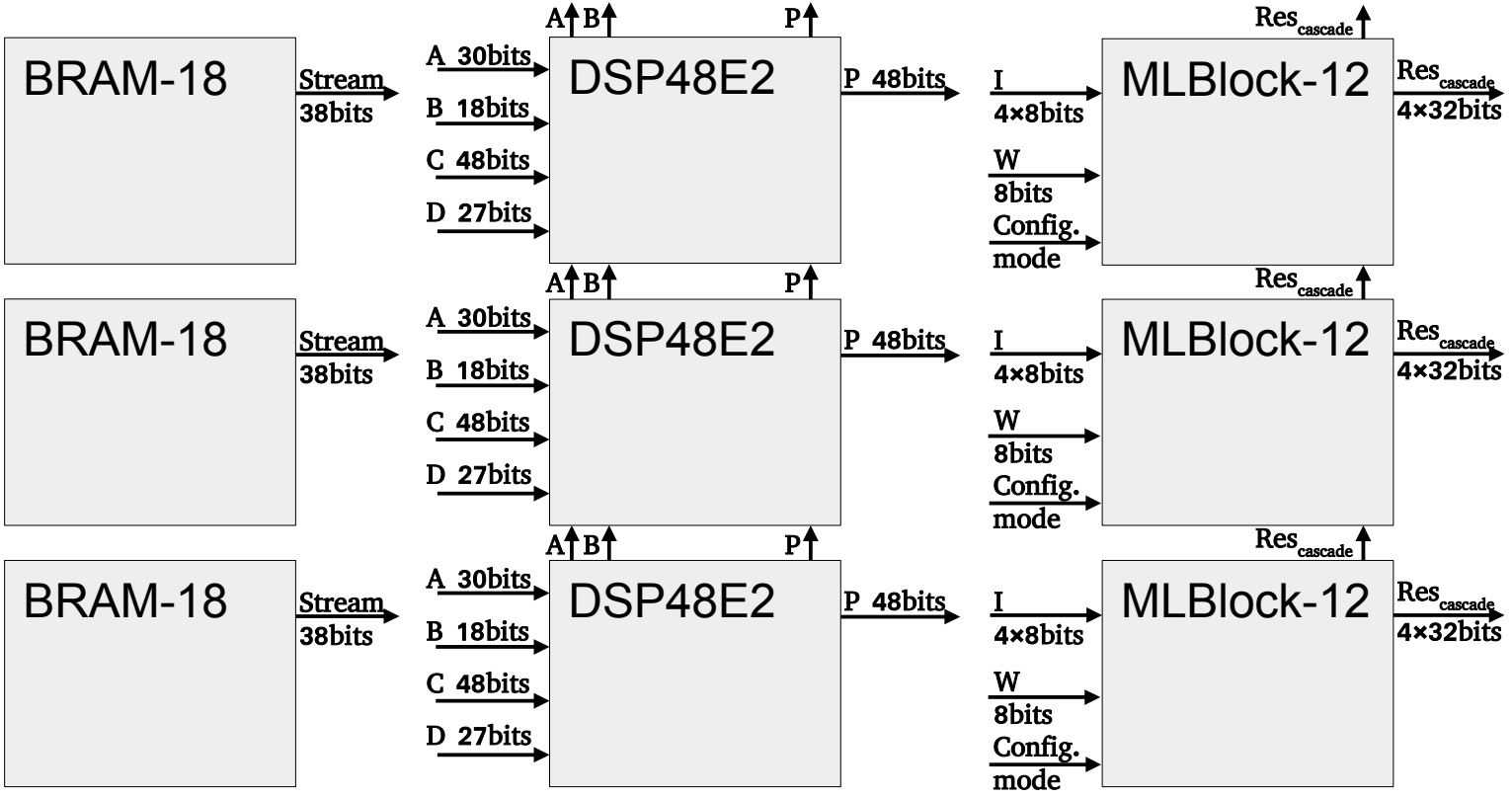
W_{stride}

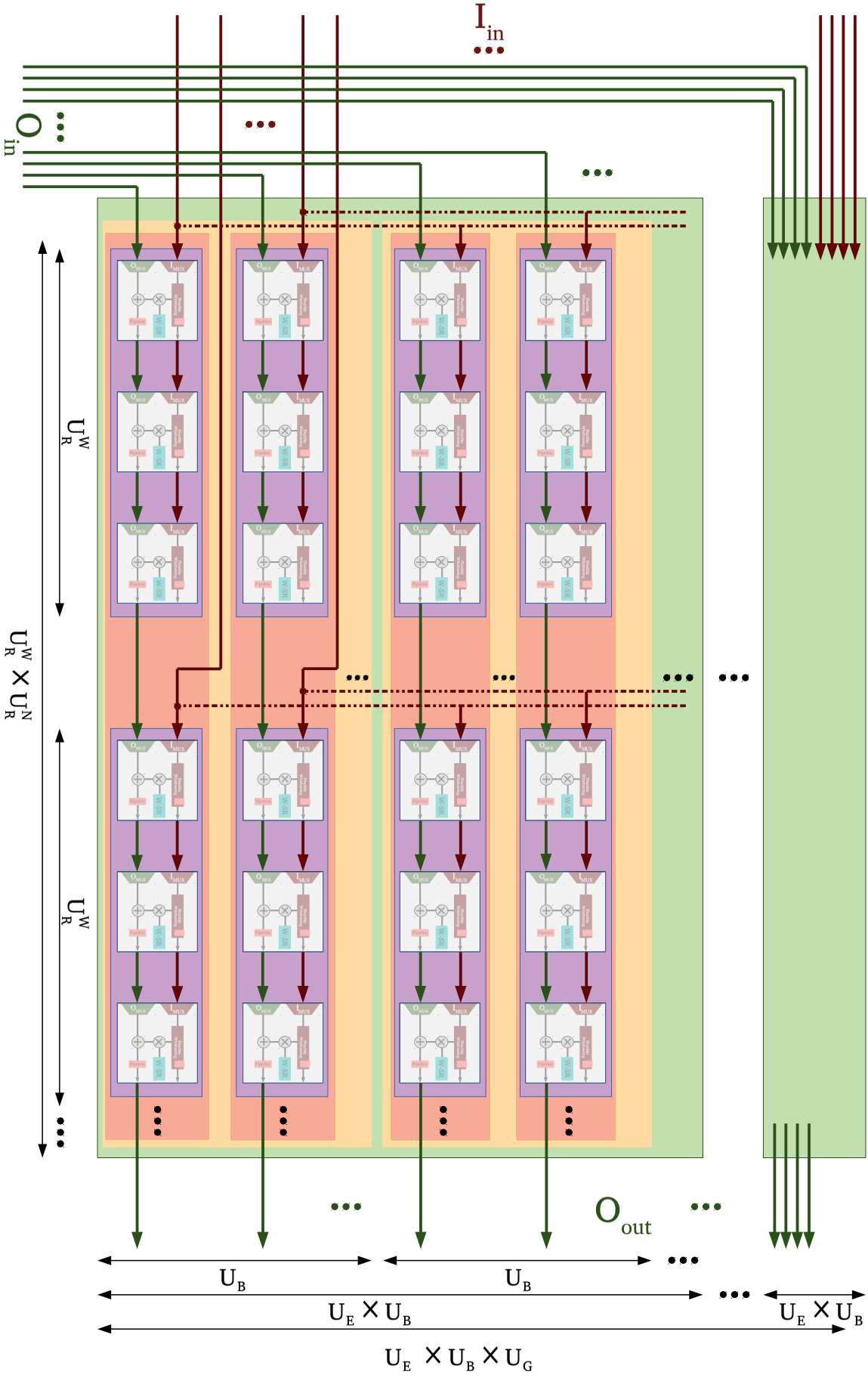
Accompany of Windowed param: x (input param)

Both: X & fx

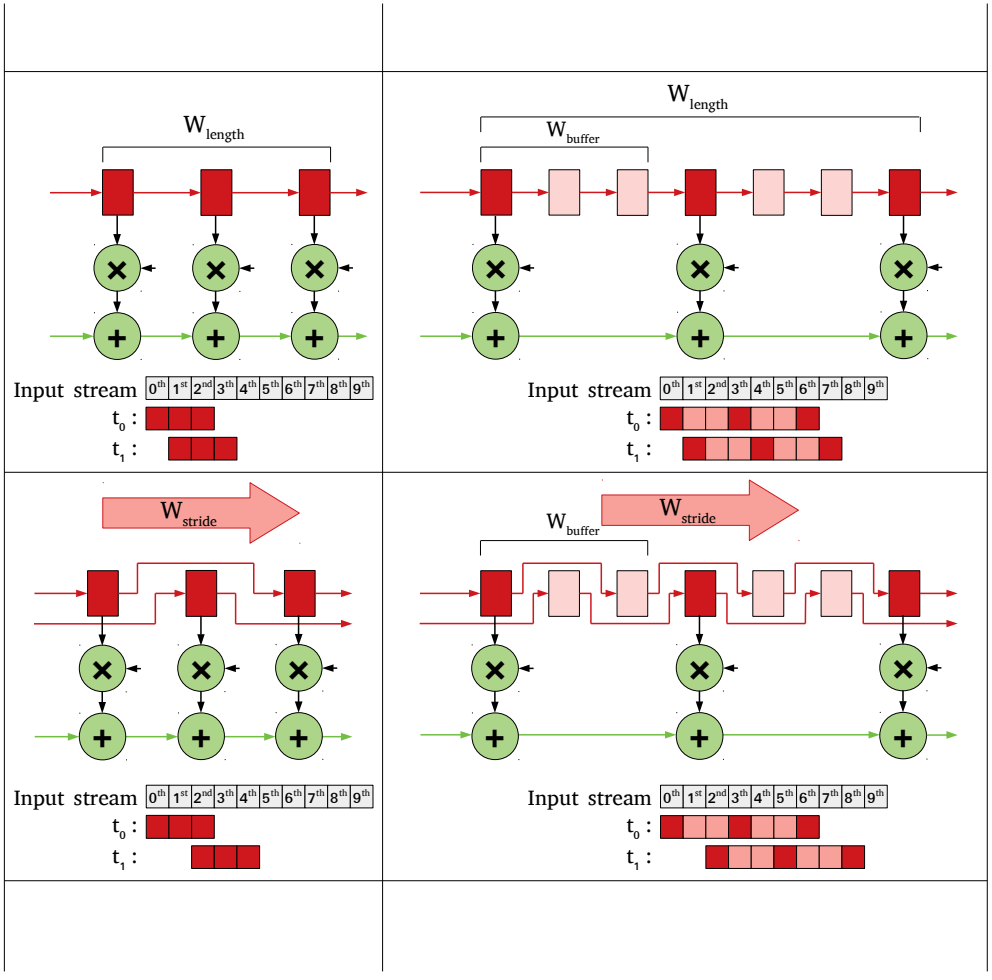


Flexible Windowing Circuit
W buffer
W stride
I config_0
I config_1
I config_2
I MUX
I mux
Reg0
Reg1
Reg2
Pipeline Reg
I
Pipeline Reg
Reg2
Reg2
Reg1
Reg1
Reg0
Reg0
I cascade


BRAM-18
Stream
38bits
A
B
P
A 30bits
B 18bits
C 48bits
D 27bits
DSP48E2
P 48bits
I
4×8bits
W
8bits
Config.
mode
Res cascade
MLBlock-12
Res cascade
4×32bits
BRAM-18
Stream
38bits
A
B
P
A 30bits
B 18bits
C 48bits
D 27bits
DSP48E2
P 48bits
I
4×8bits
W
8bits
Config.
mode
Res cascade
MLBlock-12
Res cascade
4×32bits
BRAM-18
Stream
38bits
A
B
P
A 30bits
B 18bits
C 48bits
D 27bits
DSP48E2
P 48bits
I
4×8bits
W
8bits
Config.
mode
Res cascade
MLBlock-12
Res cascade
4×32bits


I_{in}
O_{in}
U_R^W
$U_R^W \times U_R^N$
U_R^W
O_{out}
U_B
U_B
$U_E \times U_B$
$U_E \times U_B$
$U_E \times U_B \times U_G$

Windowed param: fx (filter



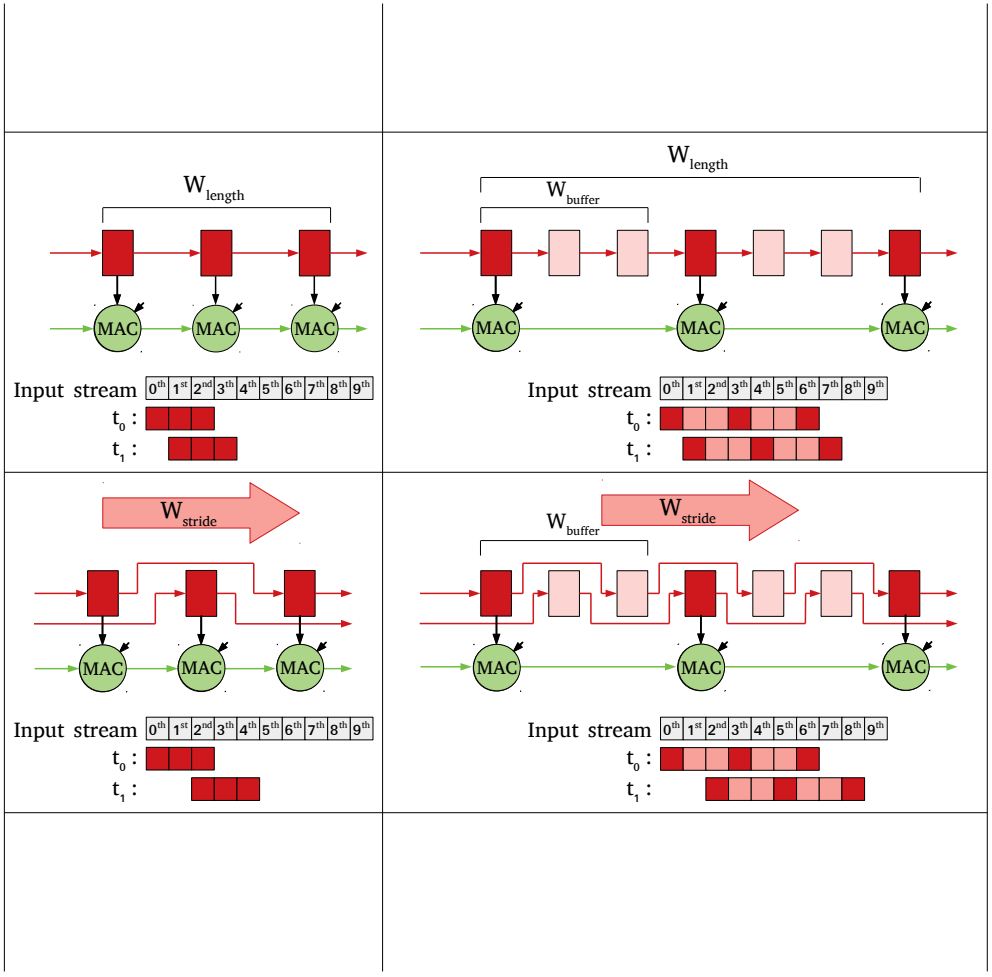
Iteration step may affects:
1- window size
2- speed of windowing
3- sample rate (dilated convolutions)

W_{stride}

Accompany of Windowed param: x (input param)

Both: X & fx

Windowed param: fx (filter



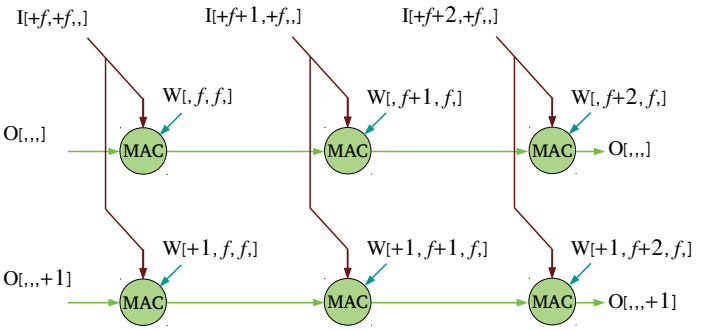
Iteration step may affects:
1- window size
2- speed of windowing
3- sample rate (dilated convolutions)

W_{stride}

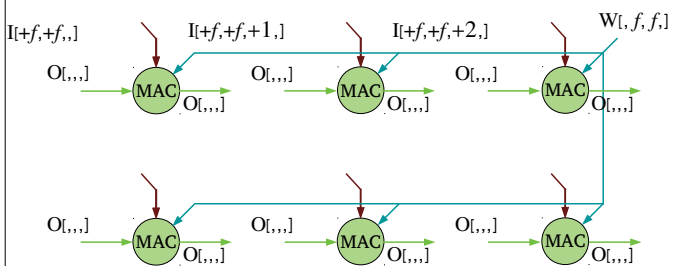
Accompany of Windowed param: x (input param)

Both: X & fx

O[,,,]+=I[+*f*,+*f*,,]×W[, *f*, *f*,]
O[,,,]+=I[+*f*+1,+*f*,,]×W[, *f*+1, *f*,]
O[,,,]+=I[+*f*+2,+*f*,,]×W[, *f*+2, *f*,]
O[,,,+1]+=I[+*f*,+*f*,,]×W[+1, *f*, *f*,]
O[,,,+1]+=I[+*f*+1,+*f*,,]×W[+1, *f*+1, *f*,]
O[,,,+1]+=I[+*f*+2,+*f*,,]×W[+1, *f*+2, *f*,]



O[,,,]+= I[+*f*,+*f*,,]× W[, *f*, *f*,]
O[+1,+1,,]+= I[+1+*f*,+*f*,+1,]× W[, *f*, *f*,]
O[+2,,,]+= I[+*f*,+*f*,+2,]× W[, *f*, *f*,]
O[,+1,,]+= I[+1+*f*,+*f*,,]× W[, *f*, *f*,]
O[+1,,,]+= I[+*f*,+*f*,+1,]× W[, *f*, *f*,]
O[+2,+1,,]+= I[+1+*f*,+*f*,+2,]× W[, *f*, *f*,]



B=3, x=2

Fx=3, k=2

K=3, c=2

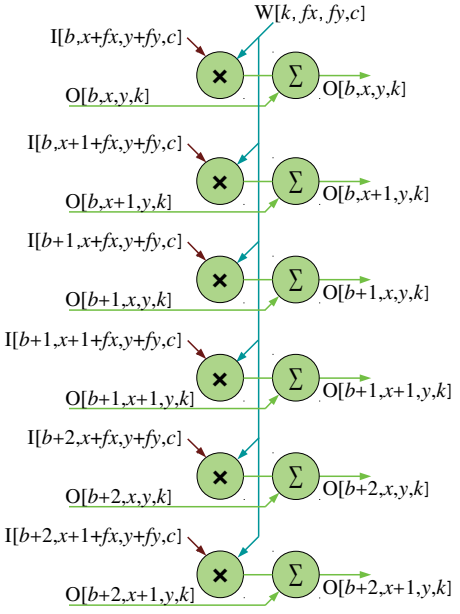
Fx=3, B=2

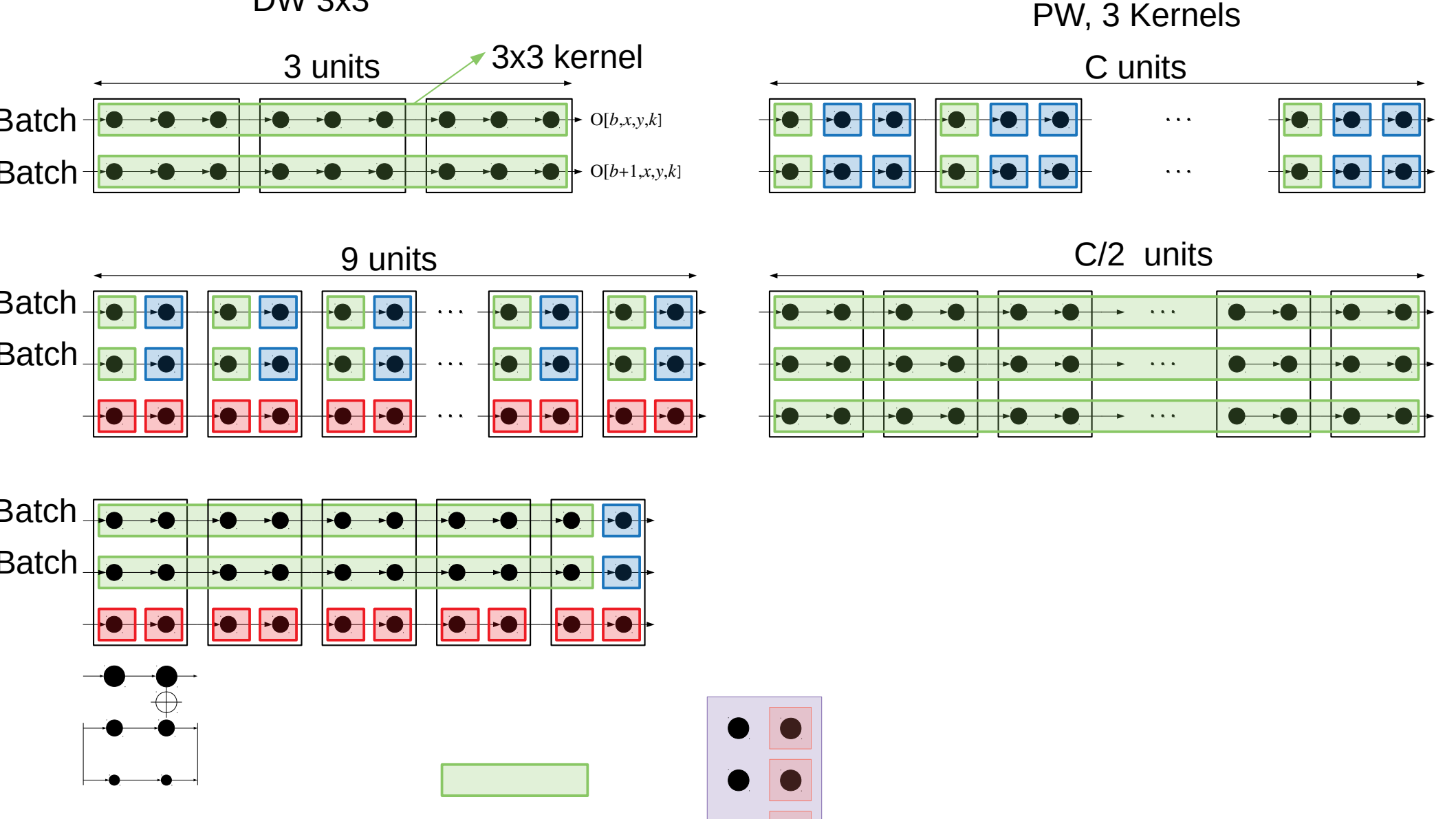
Fy=3, k=2

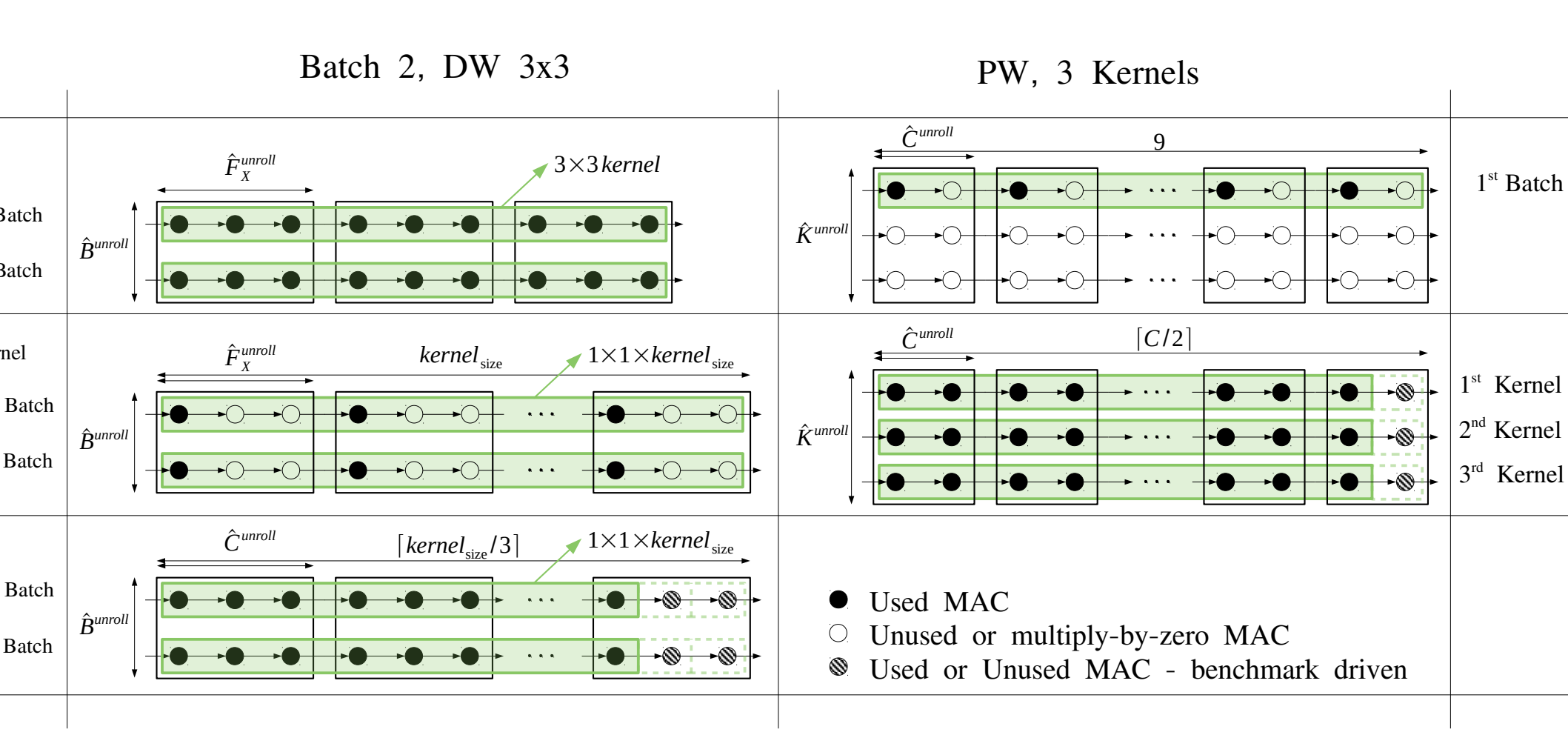
K=3, Fx=2

Fy=3, X=2

C=3, B=2


W[k, fx, fy,c]
I[b,x+fx,y+fy,c]
O[b,x,y,k]
O[b,x,y,k]
I[b,x+1+fx,y+fy,c]
O[b,x+1,y,k]
O[b,x+1,y,k]
I[b+1,x+fx,y+fy,c]
O[b+1,x,y,k]
O[b+1,x,y,k]
I[b+1,x+1+fx,y+fy,c]
O[b+1,x+1,y,k]
O[b+1,x+1,y,k]
I[b+2,x+fx,y+fy,c]
O[b+2,x,y,k]
O[b+2,x,y,k]
I[b+2,x+1+fx,y+fy,c]
O[b+2,x+1,y,k]
O[b+2,x+1,y,k]


DW 3x3
3 units
3x3 kernel
Batch
Batch
O[b,x,y,k]
O[b+1,x,y,k]
PW, 3 Kernels
C units
9 units
C/2 units


Batch 2, DW 3x3
PW, 3 Kernels
$\hat{F}_X^{unroll}$
$3\times3 kernel$
$\hat{B}^{unroll}$
$\hat{C}^{unroll}$
9
$\hat{K}^{unroll}$
1st Batch
$kernel_{size}$
$1\times1\times kernel_{size}$
$\lceil C/2 \rceil$
1st Kernel
2nd Kernel
3rd Kernel
$\lceil kernel_{size}/3 \rceil$
Used MAC
Unused or multiply-by-zero MAC
Used or Unused MAC - benchmark driven