GLADIC IP BRIF

GLADIC

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SUMMARY

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- CTR STRUCT WRITE / READ DATATYPE
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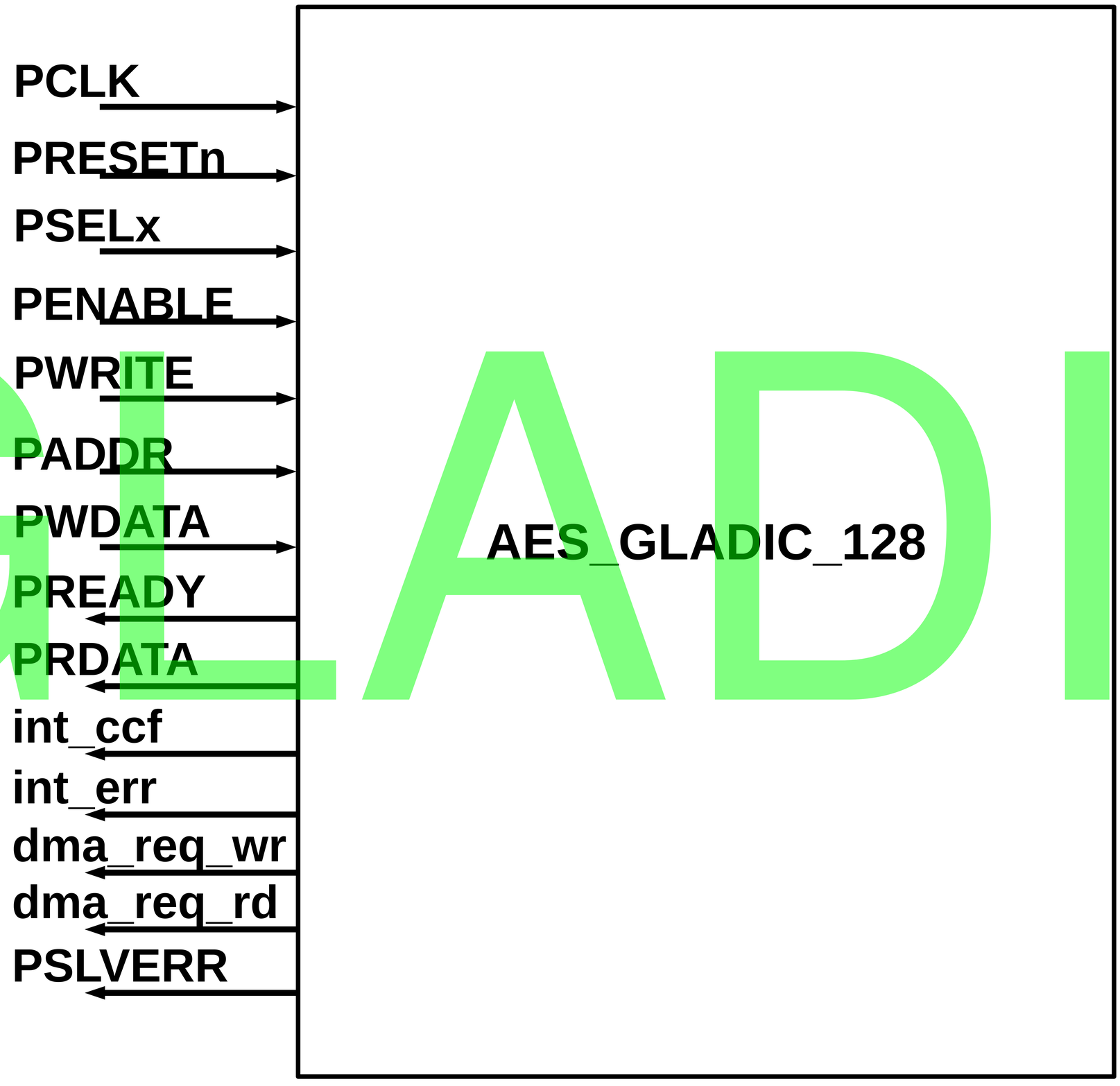
TOP BLOCK DIAGRAM



TOP BLOCK PIN DESCRIPTION

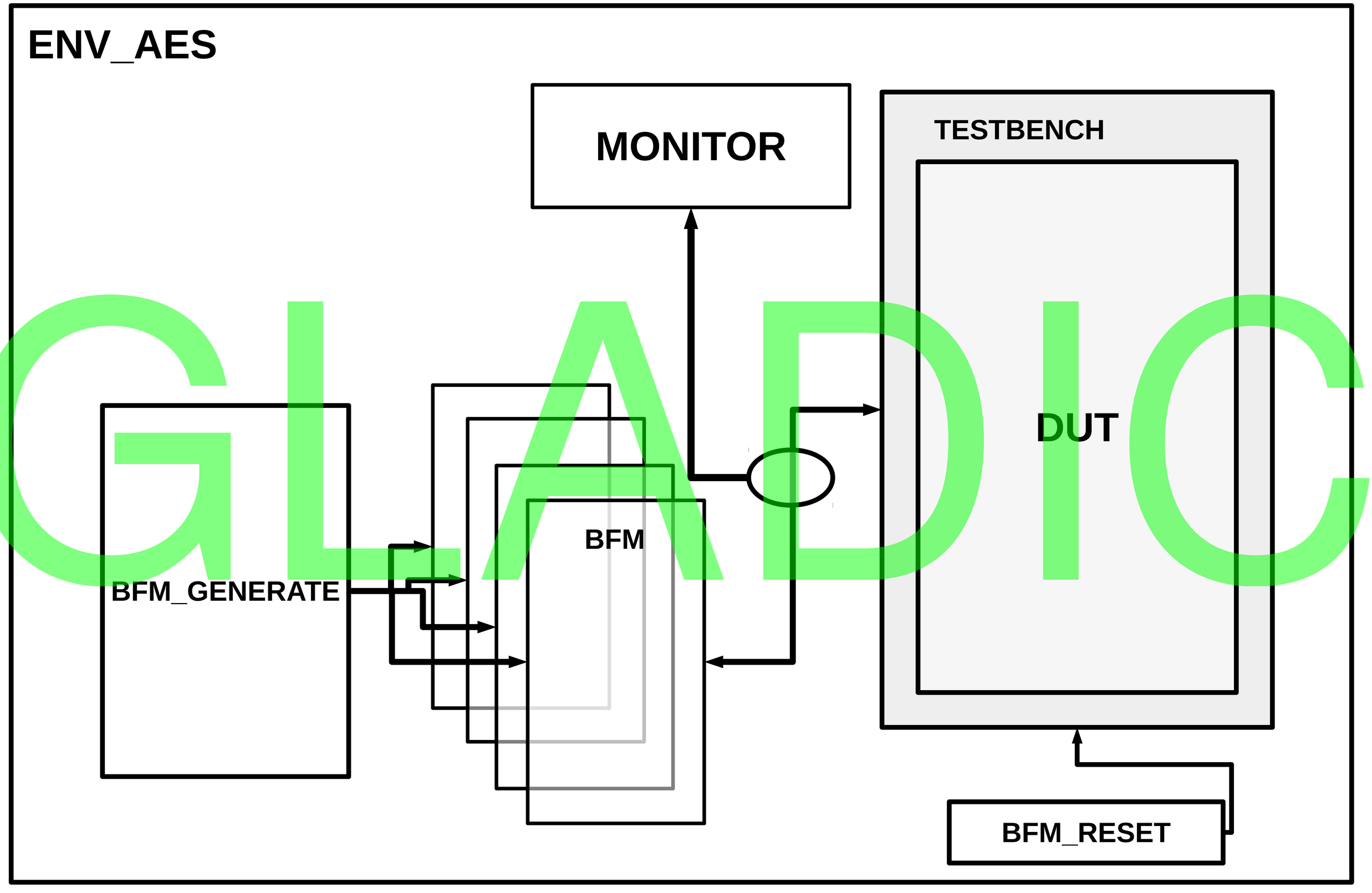
PIN DESCRIPTION			
PIN NAME	**DIRECTION**	**SIZE**	**DESCRIPTION**
PCLK	INPUT	1	Posedge Clock
PRESETn	INPUT	1	Reset negate
PSELx	INPUT	1	Enable Core
PENABLE	INPUT	1	Response from core APB to valid data
PWRITE	INPUT	1	1'b1 to Write and 1'b0 to Read
PADDR	INPUT	32	Address according ARM processor spec
PWDATA	INPUT	32	Used to write data on Core
PREADY	OUTPUT	1	This indicate to valid data and always on 1'b1
PRDATA	OUTPUT	32	Read data from core
int_ccf	OUTPUT	1	Interruption flag aes core finished
int_err	OUTPUT	1	Interruption flag aes error
dma_req_wr	OUTPUT	1	DMA request to write data on core
dma_req_rd	OUTPUT	1	DMA request to read data from core
PSLVERR	OUTPUT	1	Used to indicate error. This is not used.

INTERNAL REGISTER DESCRIPTION

CORE ADDRESS REGISTER INFO			
NAME	ADDR	SIZE*	DESCRIPTION
AES_CR	0x00h	12	CONFIGURATION REGISTER
AES_SR	0x04h	3	STATUS REGISTER
AES_DINR	0x08h	32	DATA INPUT REGISTER
AES_DOUTR	0x0Ch	32	DATA OUTPUT REGISTER
AES_KEYR0	0x10h	32	KEY REGISTER LSW
AES_KEYR1	0x14h	32	KEY REGISTER
AES_KEYR2	0x18h	32	KEY REGISTER
AES_KEYR3	0x1Ch	32	KEY REGITER MSW
AES_IVR0	0x20h	32	INITIALIZATION VECTOR REGISTER LSW
AES_IVR1	0x24h	32	INITIALIZATION VECTOR REGISTER
AES_IVR2	0x28h	32	INITIALIZATION VECTOR REGISTER
AES_IVR3	0x2Ch	32	INITIALIZATION VECTOR REGISTER MSW

* Some registers doesnt use all 32 bit register.

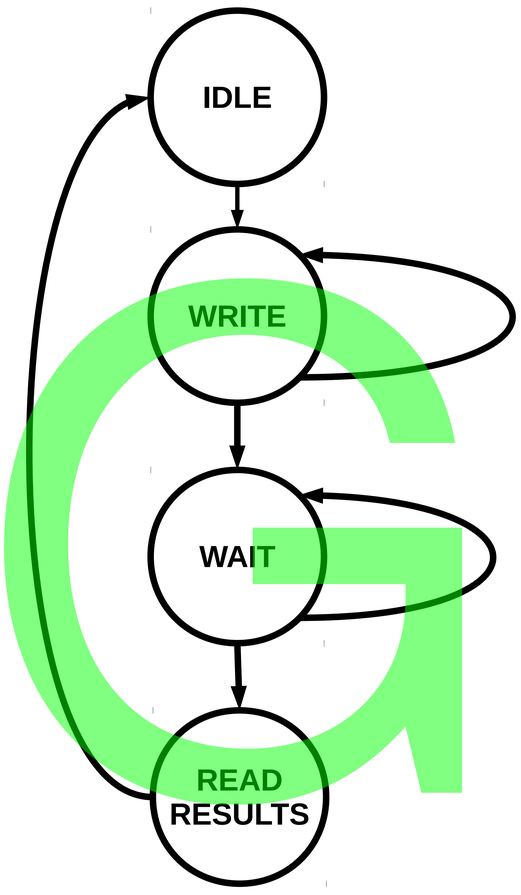
ENVIRONMENT DIAGRAM



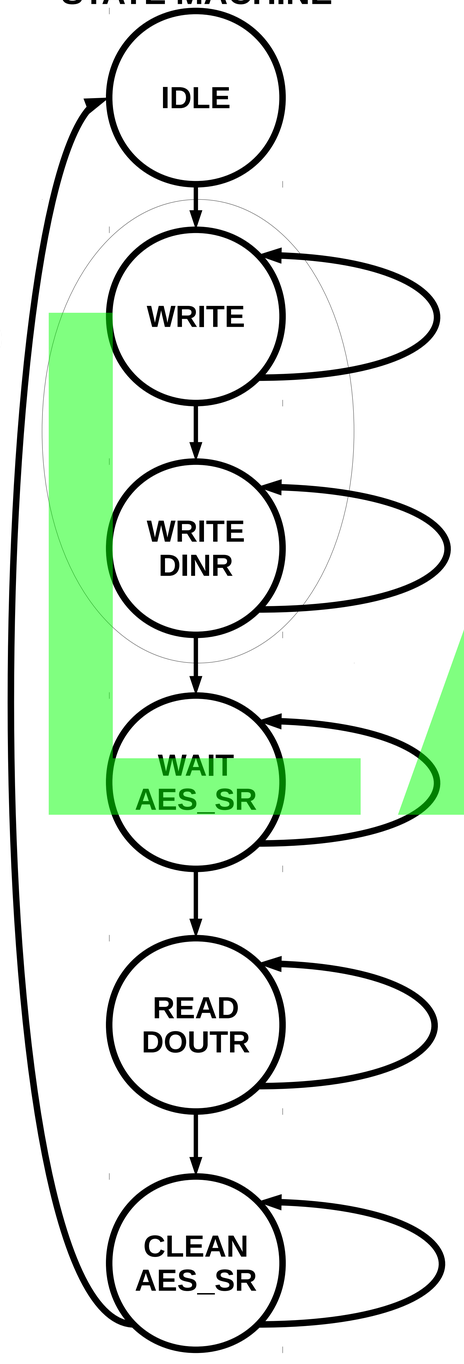
MACHINE STATES BFMs

* State machine examples

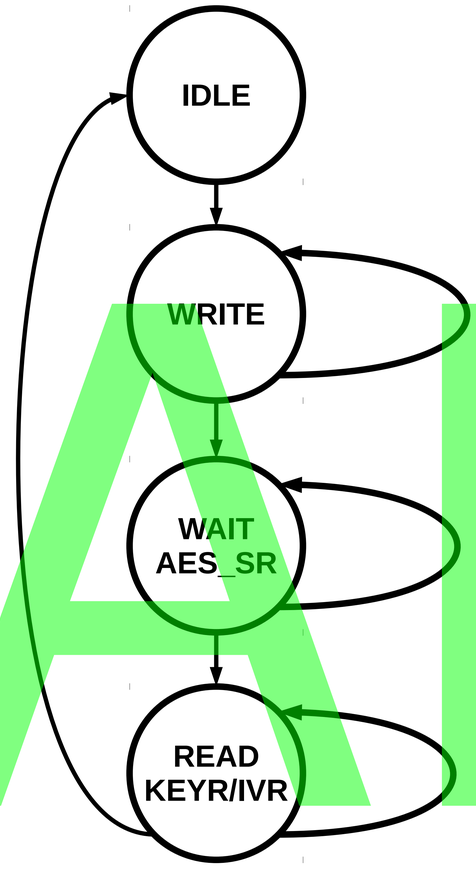
WRITE – READ
STATE MACHINE



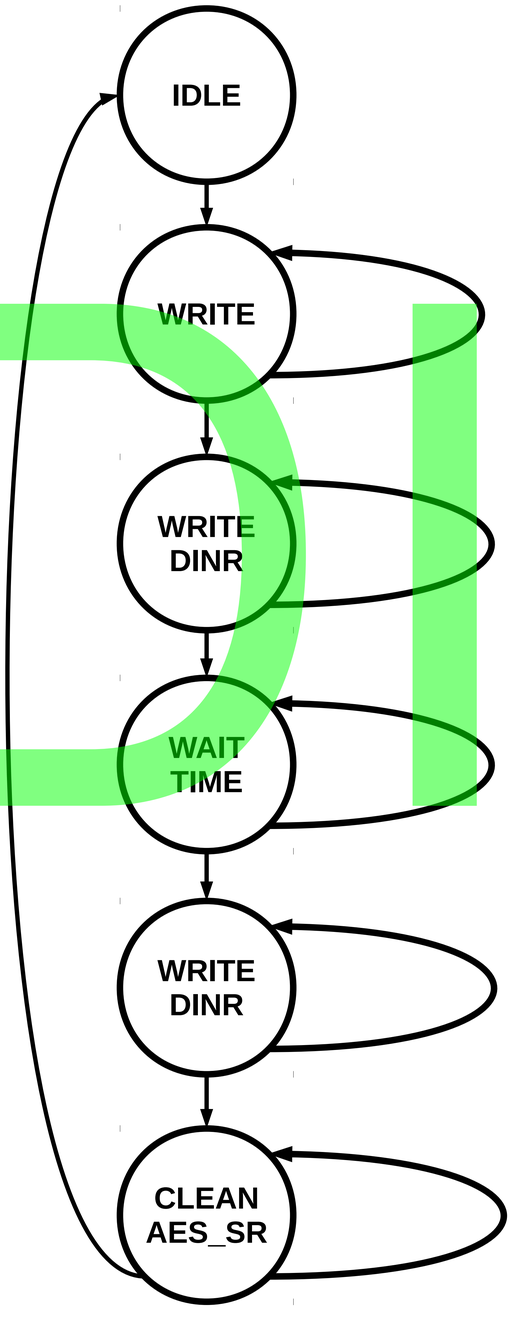
WRITE – READ
DOUTR ONLY
STATE MACHINE



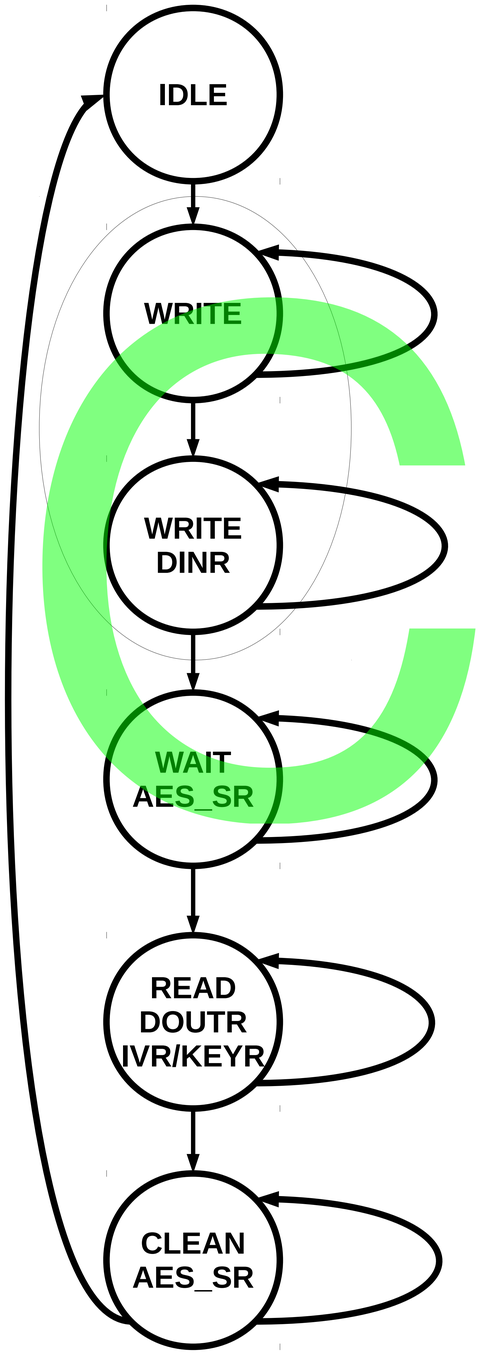
WRITE – READ
KEYR/ IVR ONLY
STATE MACHINE



WRITE DINR ONLY
STATE MACHINE



WRITE – READ
DINR/KEYR/IVR
STATE MACHINE



ECB ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_00

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	00112233	44556677	8899AABB	CCDDEEFF
KEYRX	00010203	04050607	08090A0B	0C0D0E0F
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	69C4E0D8	6A7B0430	D8CDB780	70B4C55A
DKEY	13111D7F	E3944A17	F307A78B	4D2B30C5

ECB ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_01

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	22330011	66774455	AABB8899	EEFFCCDD
KEYRX	00010203	04050607	08090A0B	0C0D0E0F
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	E0D869C4	04306A7B	B780D8CD	C55A70B4
DKEY	13111D7F	E3944A17	F307A78B	4D2B30C5

ECB ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_02

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	22330011	66774455	AABB8899	EEFFCCDD
KEYRX	00010203	04050607	08090A0B	0C0D0E0F
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	15DA8D52	2777A369	6D2C495B	0813BF90
DKEY	13111D7F	E3944A17	F307A78B	4D2B30C5

ECB ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_03

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	22330011	66774455	AABB8899	EEFFCCDD
KEYRX	00010203	04050607	08090A0B	0C0D0E0F
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	A3B412DA	43047B7C	21EC500A	DF0BF677
DKEY	13111D7F	E3944A17	F307A78B	4D2B30C5

CBC ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_00

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	6BC1BEE2	2E409F96	E93D7E11	7393172A
KEYRX*	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	7649ABAC	8119B246	CEE98E9B	12E919D7
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

*On decryption mode you must do decryption with key generated

CBC ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_01

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX*	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	ABAC7649	B2468119	8E9BCEE9	19D712E9
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

*On decryption mode you must do decryption with key generated

CBC ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_03

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX*	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	70195AF6	92A82859	D079A272	30AF0AC4
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

*On decryption mode you must do decryption with key generated

CBC ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_02

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX*	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	CD2994FC	F6AE2796	7DA445FA	289EE839
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

*On decryption mode you must do decryption with key generated

CBC ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_03

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSW			LSW
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX*	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	00010203	04050607	08090A0B	0C0D0E0F

RESULTS : DOUTR/KEY

CTEXT	70195AF6	92A82859	D079A272	30AF0AC4
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

*On decryption mode you must do decryption with key generated

CTR ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_00

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSB			LSB
TEXTX	6BC1BEE2	2E409F96	E93D7E11	7393172A
KEYRX	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	F0F1F2F3	F4F5F6F7	F8F9FAFB	FCFDFEFF

RESULTS : DOUTR/KEY

CTEXT	874D6191	B620E326	1BEF6864	990DB6CE
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

CTR ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_01

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSB			LSB
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	F0F1F2F3	F4F5F6F7	F8F9FAFB	FCFDFEFF

RESULTS : DOUTR/KEY

CTEXT	6191874D	E326B620	68641BEF	B6CE990D
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

CTR ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_02

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSB			LSB
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	F0F1F2F3	F4F5F6F7	F8F9FAFB	FCFDFEFF

RESULTS : DOUTR/KEY

CTEXT	CD3DE72D	2FEA4ED8	0B073BCF	F38BED79
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

CTR ENCRYPTION / DECRYPTION / DERIVATION DECRYPTION /KEY GENERATION DATATYPE_03

	DINR3	DINR2	DINR1	DINR0
	IVR3	IVR2	IVR1	IVR0
	KEYR3	KEYR2	KEYR1	KEYR0
	MSB			LSB
TEXTX	BEE26BC1	9F962E40	7E11E93D	172A7393
KEYRX	2B7E1516	28AED2A6	ABF71588	09CF4F3C
IVRX	F0F1F2F3	F4F5F6F7	F8F9FAFB	FCFDFEFF

RESULTS : DOUTR/KEY

CTEXT	70195AF6	92A82859	D079A272	30AF0AC4
DKEY	D014F9A8	E3944A17	F307A78B	4D2B30C5

USEFUL LINKS

- **ADVANCED ENCRYPTION STANDARD (AES)**
- **Recommendation for BlockCipher Modes of Operation**
- **OPENSSL**