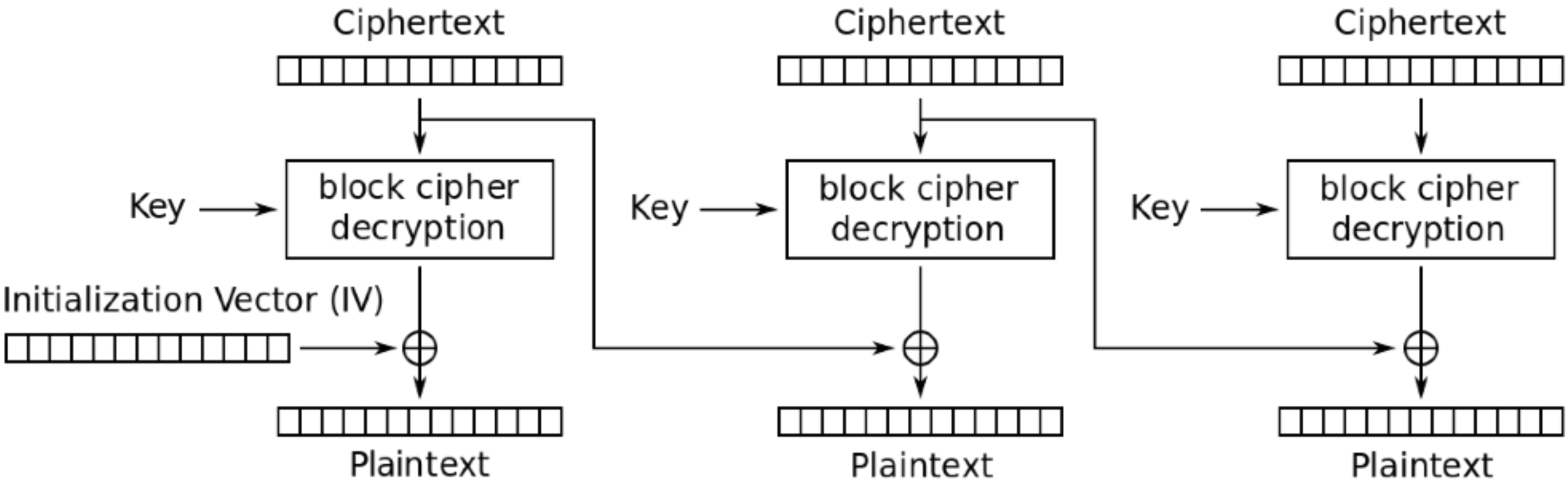
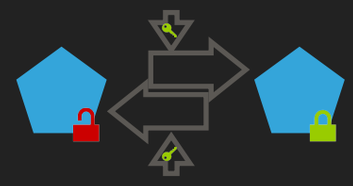
BLOCK CIPHERS AND THE IV



Cipher Block Chaining (CBC) mode decryption

https://en.wikipedia.org/wiki/Block_cipher_mode_of_operation

SOLUTIONS FOR SECURING KEY(S)



Master key in different storage	**E.g. records in DB, master key on filesystem.**	Baseline. Easy. Protects (only) agains DB theft (e.g. SQL injection)
Encrypt master key	**Use baked in 'obfuscation key' to encrypt master key. Better: Store master key in OS keyring.**	Easy. Some protection against FS access (e.g. remote file inclusion)
Derive per-record key	**Unique per record key derived from master key.** *Bonus: Protect integrity. Bind to record.*	Mostly easy. Protects against some cipher text attacks. *Use AEAD!*
Crypto Host	**All crypto operations on a dedicated host. (Master)key never leaves Crypto Host.**	Depends on architecture. Helps w. key distribution. Makes key theft difficult.
HSM	**Use Hardware Security Module as Crypto Host.**	Expensive & difficult. "Crypto Host on steroids".