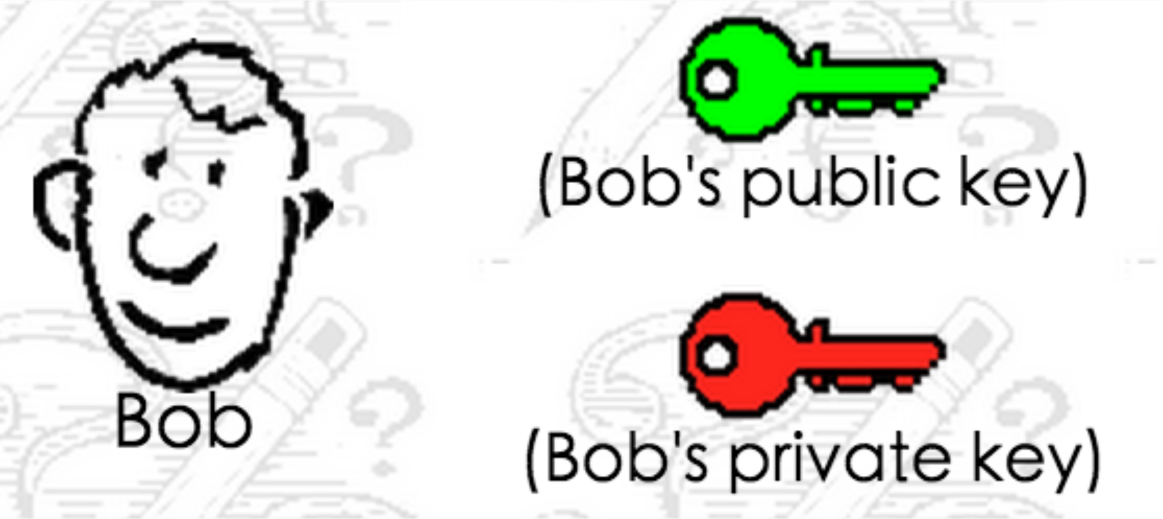
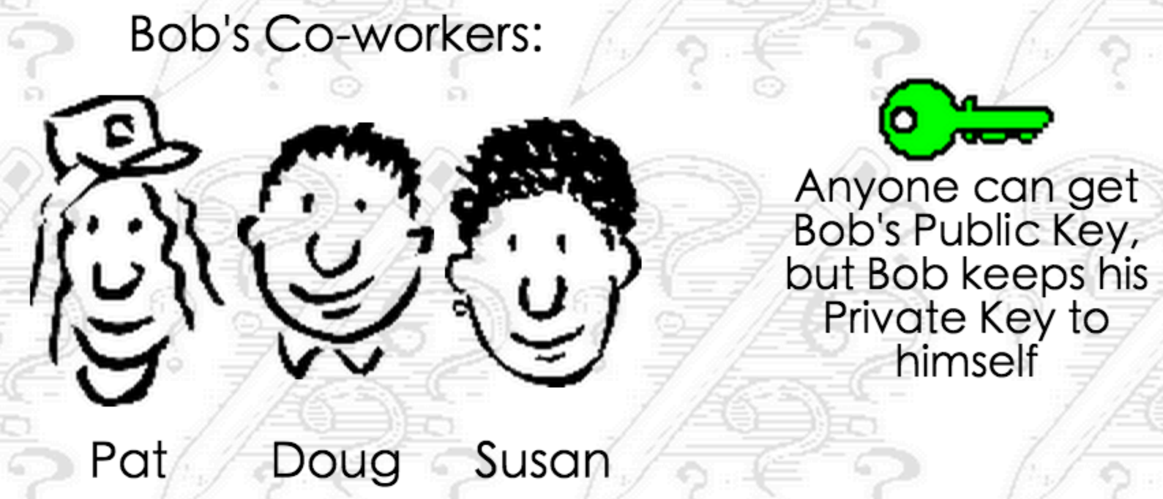
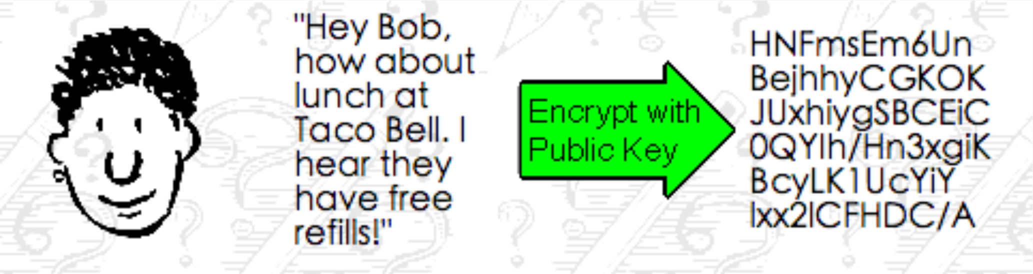
苏珊要给鲍勃写一封保密的信。她写完后用鲍勃的公钥加密，就可以达到保密的效果。



鲍勃有两把钥匙，一把是公钥，另一把是私钥。


Bob's Co-workers:
Pat
Doug
Susan
Anyone can get Bob's Public Key, but Bob keeps his Private Key to himself

鲍勃把公钥送给他的朋友们----帕蒂、道格、苏珊----每人一把。



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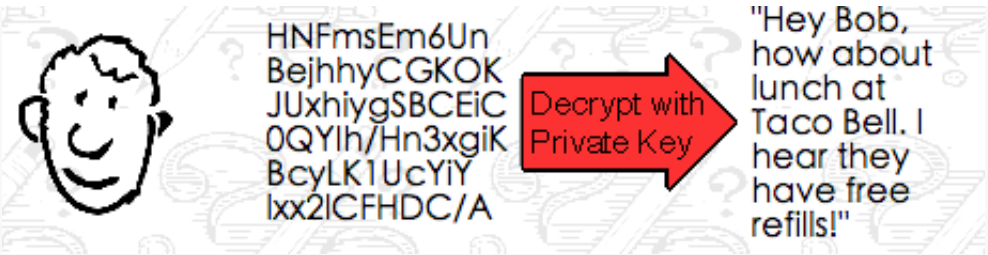
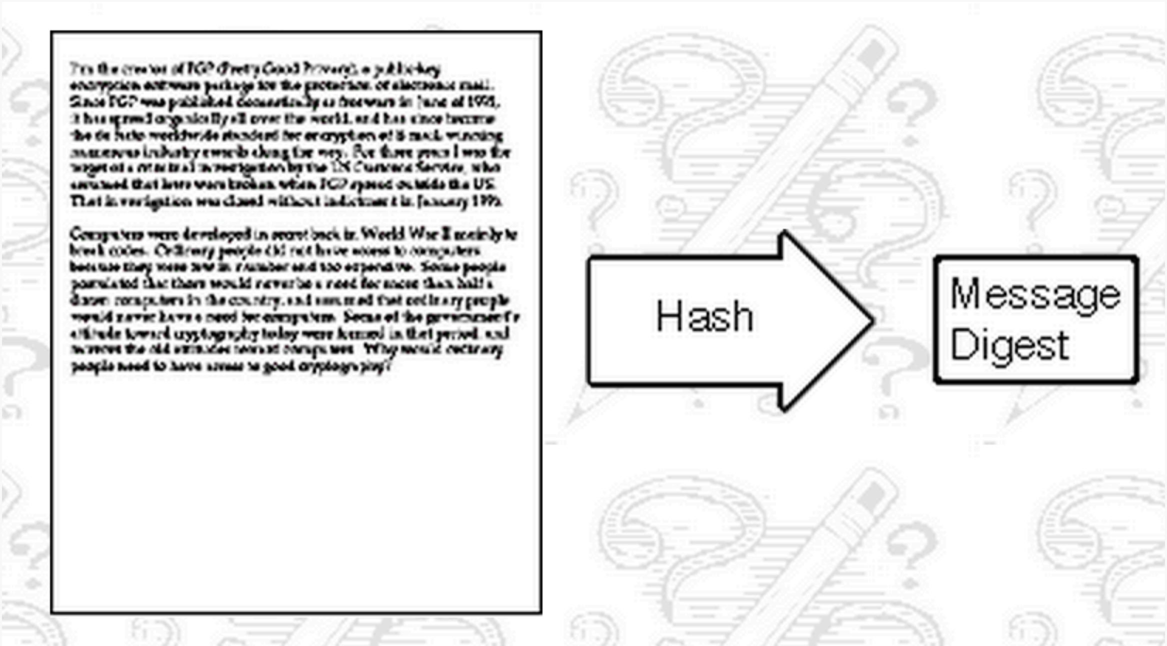


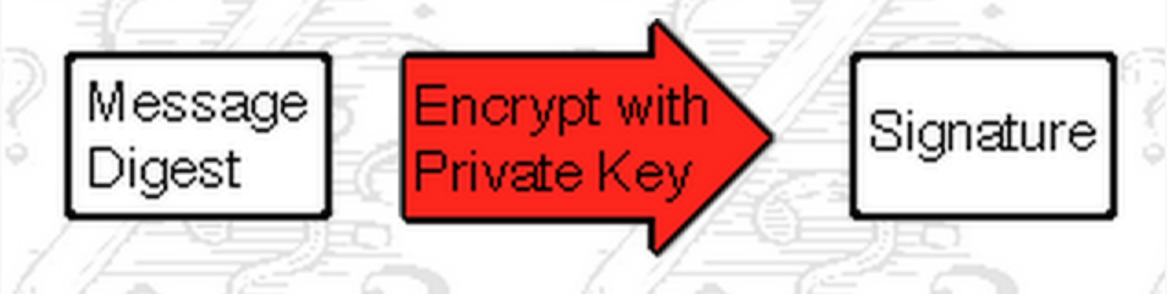
鲍勃收信后，用私钥解密，就看到了信件内容。这里要强调的是，只要鲍勃的私钥不泄露，这封信就是安全的，即使落在别人手里，也无法解密。



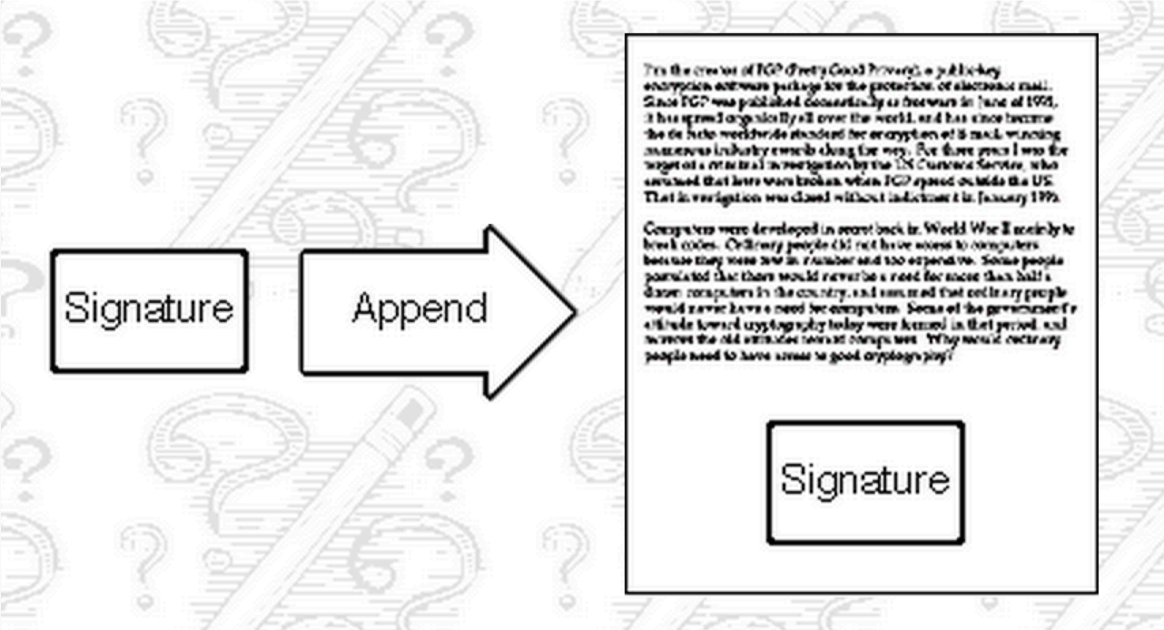
I'm the creator of PGP (Pretty Good Privacy), a public-key encryption software package for the protection of electronic mail. Since PGP was published domestically as freeware in June of 1991, it has spread organically all over the world, and has since become the de facto worldwide standard for encryption of E-mail, winning numerous industry awards along the way. For three years I was the target of a criminal investigation by the US Customs Service, who assumed that laws were broken when PGP spread outside the US. That investigation was closed without indictment in January 1996.

Computers were developed in secret back in World War II mainly to break codes. Ordinary people did not have access to computers because they were few in number and too expensive. Some people postulated that there would never be a need for more than half a dozen computers in the country, and assumed that ordinary people would never have a need for computers. Some of the government's attitude toward cryptography today were formed in that period, and mirrors the old attitudes toward computers. Why would ordinary people need to have access to good cryptography?

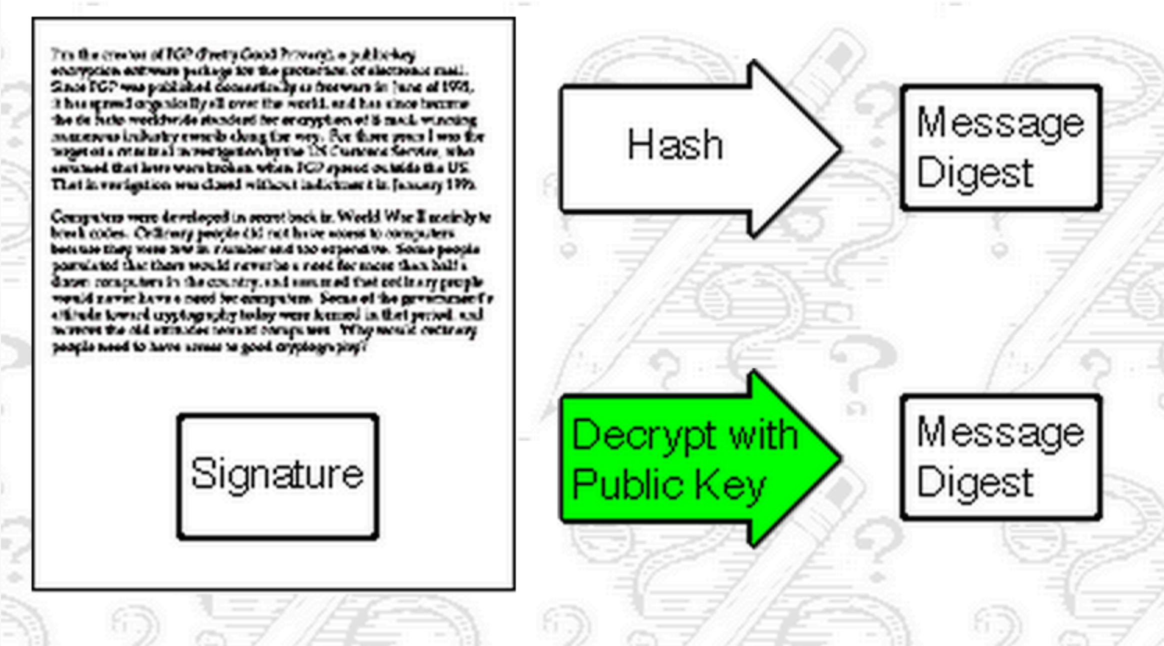
鲍勃给苏珊回信，决定采用"数字签名"。他写完后先用Hash函数，生成信件的摘要（digest）。



然后，鲍勃使用私钥，对这个摘要加密，生成"数字签名"（signature）。

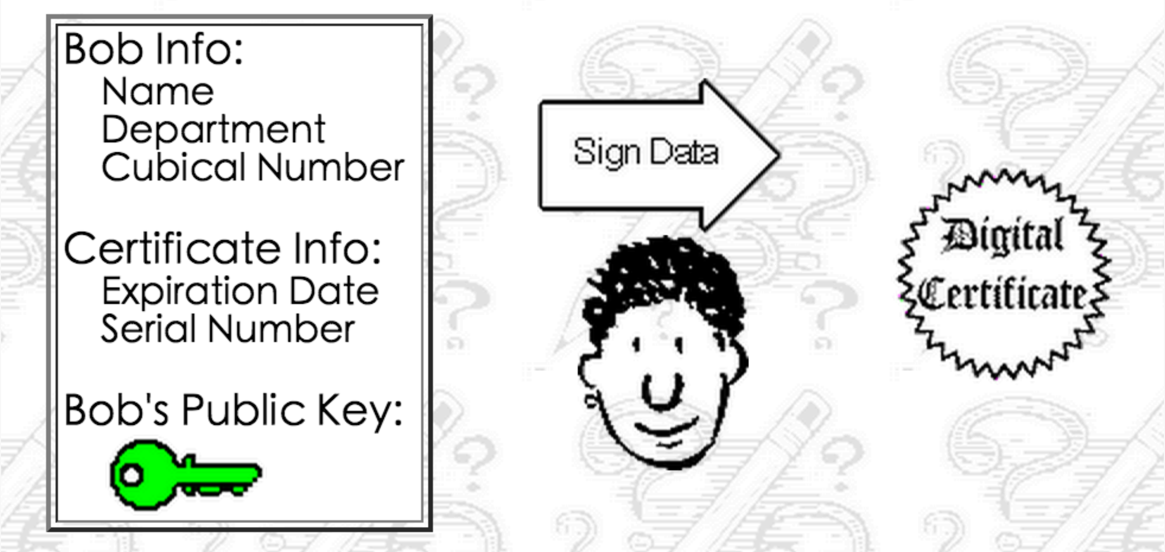


鲍勃将这个签名，附在信件下面，一起发给苏珊。



苏珊收信后，取下数字签名，用鲍勃的公钥解密，得到信件的摘要。由此证明，这封信确实是鲍勃发出的。 苏珊再对信件本身使用Hash函数，将得到的结果，与上一步得到的摘要进行对比。如果两者一致，就证明这封信未被修改过。

复杂的情况出现了。道格想欺骗苏珊，他偷偷使用了苏珊的电脑，用自己的公钥换走了鲍勃的公钥。此时，苏珊实际拥有的是道格的公钥，但是还以为这是鲍勃的公钥。因此，道格就可以冒充鲍勃，用自己的私钥做成"数字签名"，写信给苏珊，让苏珊用假的鲍勃公钥进行解密。



后来，苏珊感觉不对劲，发现自己无法确定公钥是否真的属于鲍勃。她想到了一个办法，要求鲍勃去找"证书中心"（certificate authority，简称CA），为公钥做认证。证书中心用自己的私钥，对鲍勃的公钥和一些相关信息一起加密，生成"数字证书"（Digital Certificate）。

鲍勃拿到数字证书以后，就可以放心了。以后再给苏珊写信，只要在签名的同时，再附上数字证书就行了。

苏珊收到Bob的信，先用CA的公钥解开数字证书，就可以拿到鲍勃真实的公钥了，然后就能证明"数字签名"是否真的是鲍勃签的。