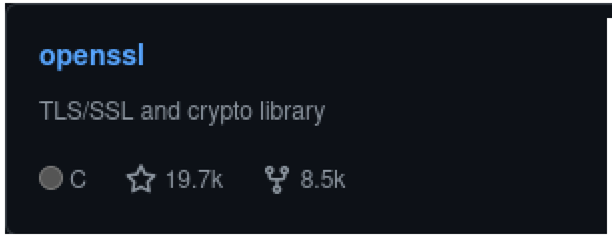
Alexandru Calotoiu

DaFlEx

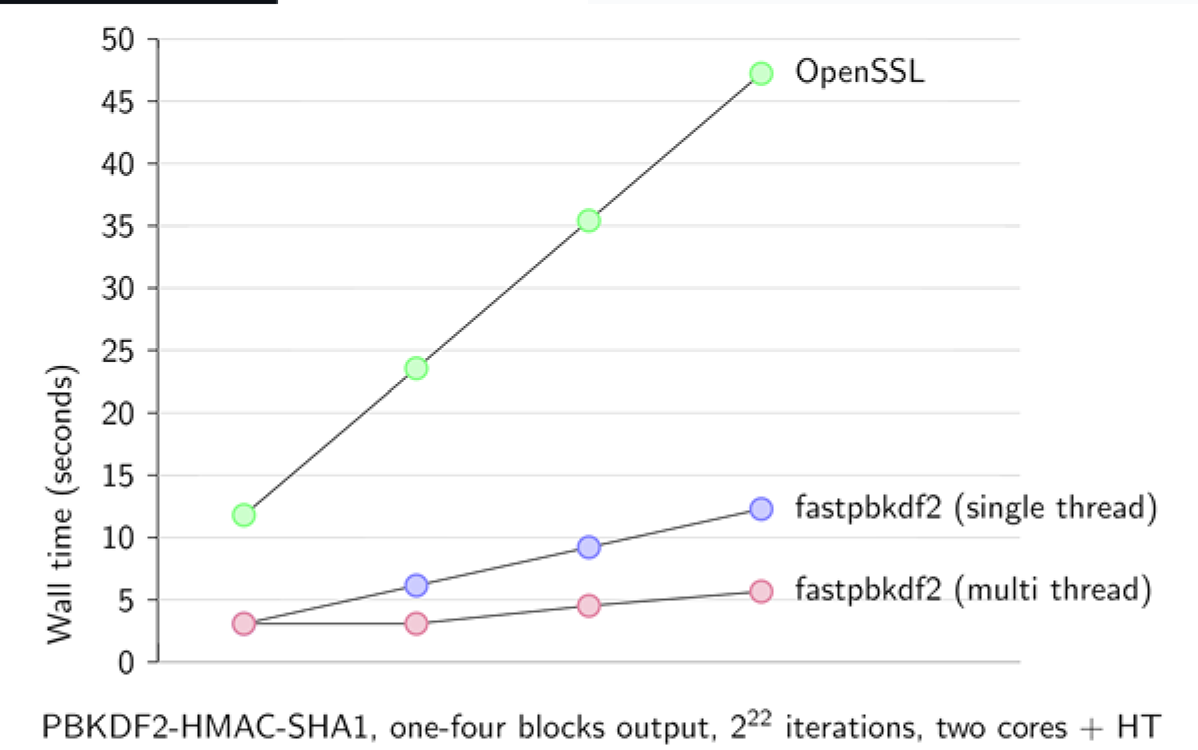
C2DaCe – an update



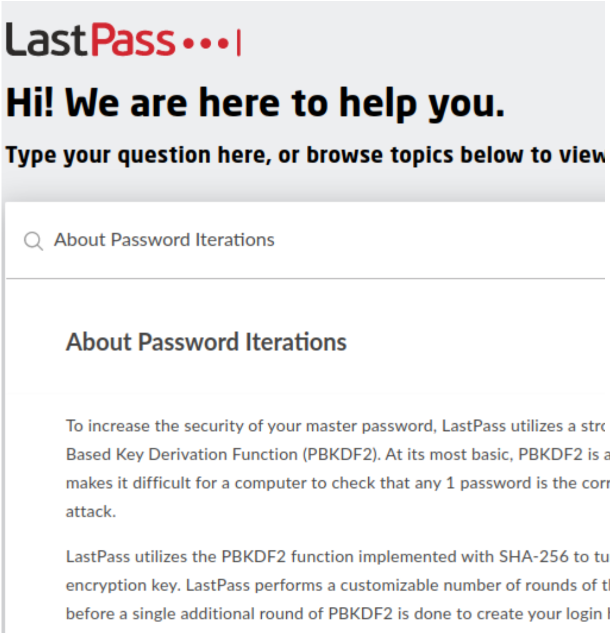
openssl

TLS/SSL and crypto library

● C ☆ 19.7k 8.5k



PBKDF2-HMAC-SHA1, one-four blocks output, 2^{22} iterations, two cores + HT



LastPass•••|

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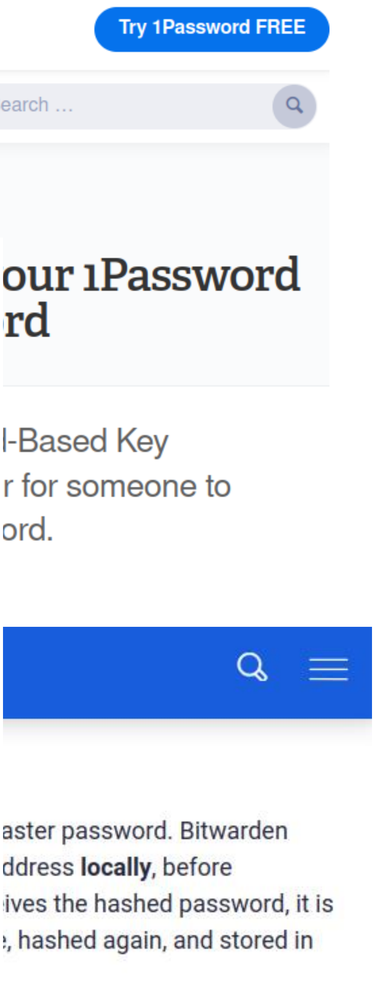
About Password Iterations

About Password Iterations

To increase the security of your master password, LastPass utilizes a stro
Based Key Derivation Function (PBKDF2). At its most basic, PBKDF2 is a "password-strengthening algorithm" that makes it difficult for a computer to check that any 1 password is the correct master password during a compromising attack.

LastPass utilizes the PBKDF2 function implemented with SHA-256 to turn your master password into your encryption key. LastPass performs a customizable number of rounds of the function to create the encryption key, before a single additional round of PBKDF2 is done to create your login hash.



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SECURITY AND PRIVACY

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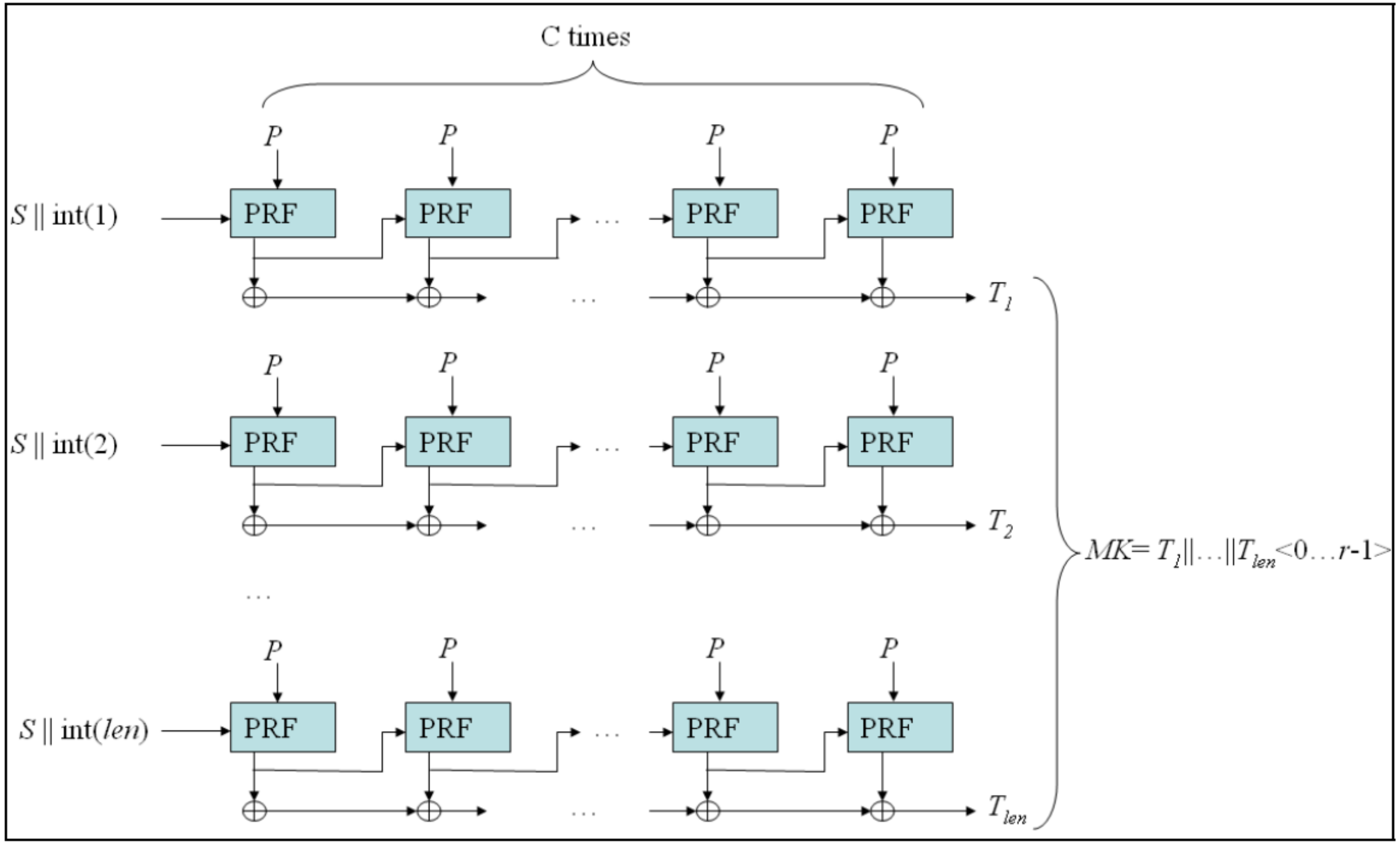
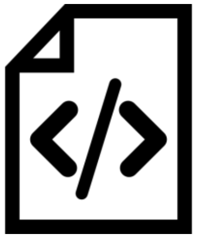
:, hashed again, and stored in

The default iteration count used with PBKDF2 is 100,001 iterations on the client (*client-side iteration count is configurable from your account settings*), and then an additional 100,000 iterations when stored on our servers (for a total of 200,001 iterations by default). The Organization key is shared via RSA-2048.

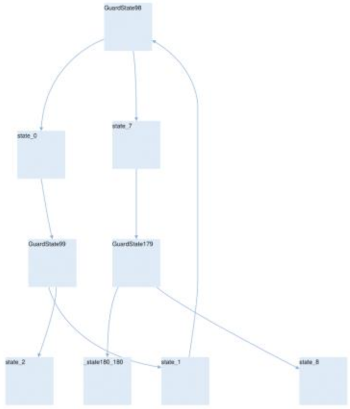
PBKDF2


C times
P
S || int(1)
PRF
. . .
T_1
S || int(2)
T_2
S || int(len)
T_{len}
$MK = T_1 || \ldots || T_{len}\langle 0 \ldots r\text{-}1 \rangle$

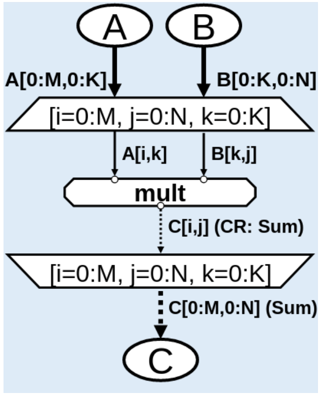
C2DaCe for PBKDF2



C code



Initial SDFG



Parallel SDFG

Parallel Executable

Status

- Extract the PBKDF2 implementation from OpenSSL and create a micro-benchmark (note that we will still use the SHA functions from OpenSSL as external calls).
- Add support to handle pointers to linear data by splitting the pointer into a data container and an offset variable.
- Handle the struct pointers used by OpenSSL (state pointers) to keep a state between the SHA API calls. This is done by creating data dependencies into the SDFG that follow the real dependencies needed to execute the SHA API calls successfully.
- Divide the state pointer dependencies into the requirement that the pointer was initialized and the real data dependency created by reading or writing to the state.
- Test and validate the correctness of the SDFG

- If needed, expand the LoopToMap transformation that identifies the parallelization opportunities. It usually acts on for loops but the loop inside PBKDF2 is a while loop, some tweaking might be needed.

- Test the performance of the resulting compiled SDFG