VLSI
MIDSEM PROJECT

Kasukabe Defence Group

Team Members :

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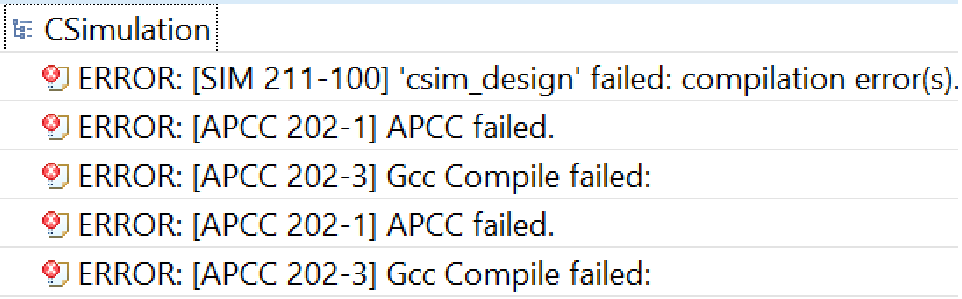
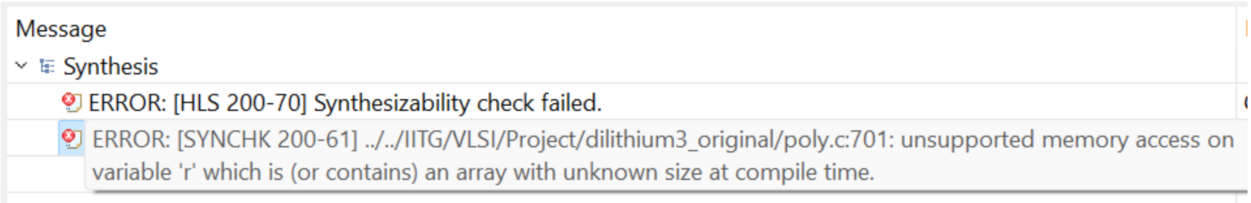
- <u>The errors we got while executing the original file</u>:
  Errors in simulation->



```
CSimulation
ERROR: [SIM 211-100] 'csim_design' failed: compilation error(s).
ERROR: [APCC 202-1] APCC failed.
ERROR: [APCC 202-3] Gcc Compile failed:
ERROR: [APCC 202-1] APCC failed.
ERROR: [APCC 202-3] Gcc Compile failed:
```

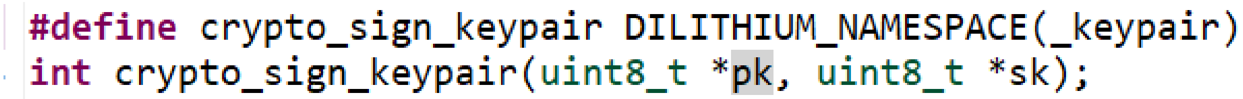
Errors in synthesis->



```
Message
Synthesis
ERROR: [HLS 200-70] Synthesizability check failed.
ERROR: [SYNCHK 200-61] ../../IITG/VLSI/Project/dilithium3_original/poly.c:701: unsupported memory access on variable 'r' which is (or contains) an array with unknown size at compile time.
```

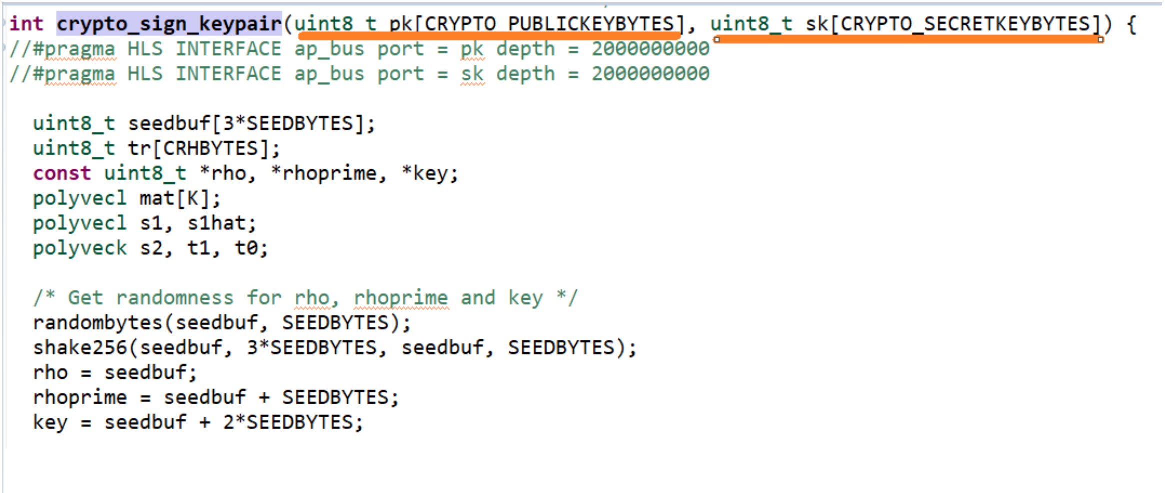
- <u>Changes that we did in the project along with their reasoning</u>:-

1. The Source will contain all files except PQCgenKAT_sign.c.
   <u>Reasoning</u>: Since PQCgenKAT_sign.c contains error checks and no new function is implemented, which gives us the clue that it should be in testbench.
2. Testbench contains only PQCgenKAT_sign.c.
   <u>Reasoning</u>: As we can see only PQCgenKAT_sign.c contains the top function- crypto_sign_keypair, it is the only file that we are keeping in testbench.
3. All the “#define macros” are commented out in api.h and sign.h.
   <u>Reasoning:</u> Since only these files contain our top function, crypto_sign_keypair. The reason why we did this is because using #define is renaming our function and hence its making it hard for our software to discover it. For example, we can see that here



```
#define crypto_sign_keypair DILITHIUM_NAMESPACE(_keypair)
int crypto_sign_keypair(uint8_t *pk, uint8_t *sk);
```

   The crypto_sign_keypair is getting renamed as DILITHIUM_NAMESPACE.
4. randombytes() function exists in two different files randombytes.c and rng.c. The function name is changed into randombytes2() in randombytes.c so as to distinguish those two functions.

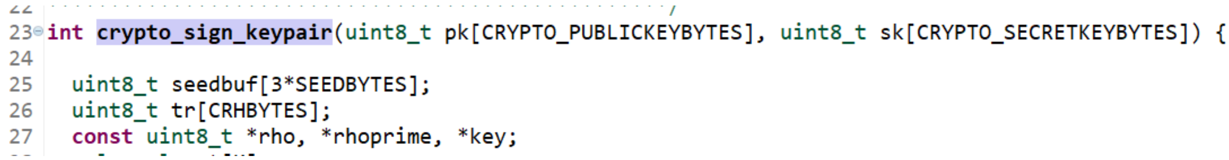


```
int crypto_sign_keypair(uint8_t pk[CRYPTO_PUBLICKEYBYTES], uint8_t sk[CRYPTO_SECRETKEYBYTES]) {
//#pragma HLS INTERFACE ap_bus port = pk depth = 2000000000
//#pragma HLS INTERFACE ap_bus port = sk depth = 2000000000

  uint8_t seedbuf[3*SEEDBYTES];
  uint8_t tr[CRHBYTES];
  const uint8_t *rho, *rhoprime, *key;
  polyvecl mat[K];
  polyvecl s1, s1hat;
  polyveck s2, t1, t0;

  /* Get randomness for rho, rhoprime and key */
  randombytes(seedbuf, SEEDBYTES);
  shake256(seedbuf, 3*SEEDBYTES, seedbuf, SEEDBYTES);
  rho = seedbuf;
  rhoprime = seedbuf + SEEDBYTES;
  key = seedbuf + 2*SEEDBYTES;
```

5. Unsupported memory access error was handled by replacing pointers with fixed sized array.



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  const uint8_t *rho, *rhoprime, *key;
```