CS3021/3421 Tutorial 2 Notes

(i) In general, your assembly language program needs to be better commented.

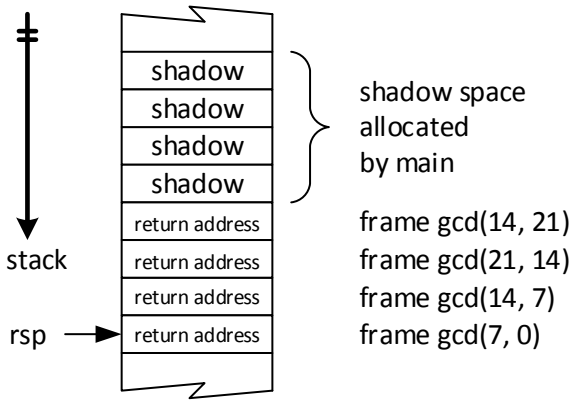
(ii) The code for p() is not quite straight forward as it might at first seem. First shadow space needs to be allocated by p() when it calls min(). Must assume that min() needs shadow space. P() contains two calls to min(). Need only allocate shadow space once and "resuse" for each call to min(). Parameters k and l are passed to p() in r8 and r9. Must ensure that these parameters survive the first call to min() which is quite entitled to overwrite r8 and r9 as they are volatile registers according to the x64 procedure calling convention. Example code saves r8 and r9 in p's shadow space.

(iii) There is no need to allocate shadow space for the recursive calls to gcd. Treat gcd as a leaf function.

(iii) a%b should be calculated using idiv. idiv uses signed arithmetic whilst div uses unsigned arithmetic. idiv divides rdx:rax (128 bits) by the instruction operand (64 bits). The quotient is returned in rax and the remainder in rdx. rdx should be initialised using cqo as it sign extends rax across rdx. Zeroing rdx is not the same, although it will work with the examples given (need better test cases).

(iv) Some students still had trouble with global variable g which needs to be allocated in t2.asm and its "interface" specified in t2.h (see sample answer).

(v) Layout of stack frames must matched submitted code.



4 stack frames
only return address stored in each frame

(vi) Some students did not manage to get printf() working in q(). Study the example solution. NB: solution assumes that printf() could overwrite any parameters passed to it on the stack (can't find any official documentation on thid issue).

(vii) A simple function qns() is provided which that generates an exception when called as it does not allocate shadow space before calling printf().