INTRODUCTION TO THREADING

THE CPU IS THE BRAIN OF A COMPUTER

"CPU" STANDS FOR CENTRAL PROCESSING UNIT

THE CPU IS WHERE INSTRUCTIONS ARE EXECUTED

MOST CPUS ARE MICROPROCESSORS, WHICH MEANS THAT THEY CONSIST OF A SINGLE, INTEGRATED CIRCUIT

"CHIP GIANTS"

INTEL ("INTEL INSIDE") AND AMD ARE BASICALLY CPU MANUFACTURING COMPANIES

"PARALLELISM" IS VERY IMPORTANT

MULTI-CORE ARCHITECTURES HAVE GOTTEN BIG IN RECENT YEARS

SO HAS CLOUD COMPUTING, WHERE OPERATIONS ARE RUN ON MANY MACHINES QUITE FAR AWAY FROM EACH OTHER

IT HAS BECOME MORE AND MORE AND MORE IMPORTANT THAT PROGRAMS BE ABLE TO RUN DIFFERENT OPERATIONS SIMULTANEOUSLY

JAVA AND ALL PROGRAMMING LANGUAGES
HELP PROGRAMMERS WRITE CODE THAT DOES
DIFFERENT THINGS SIMULTANEOUSLY VIA

THREADING

IS A KEY COMPUTER SCIENCE CONCEPT

THE "MAIN THREAD"

BY DEFAULT ALL THE CODE WE HAVE WRITTEN SO FAR RAN ON A SINGLE THREAD

THAT MEANS, ALL INSTRUCTIONS WERE EXECUTED ONE-AFTER-ANOTHER (SERIALLY)

THIS DEFAULT SINGLE THREAD IS CALLED "THE MAIN THREAD"

PROCESSES VERSUS THREADS

EVERY PROGRAM RUNS IN ITS OWN PROCESS

A PROCESS CAN 'SPAWN OFF' MULTIPLE THREADS

(EVEN IF A PROCESS DOES NOT CREATE ANY THREADS, IT STILL HAS THE MAIN DEFAULT THREAD WHICH IS BEING EXECUTED)

IN A PROGRAM, DIFFERENT THREADS HAVE INSTRUCTIONS THAT MAYBE EXECUTED SIMULTANEOUSLY.

BUT ALL OF THOSE THREADS ARE CONTROLLED BY THE SAME PROCESS

PROGRAM : PROCESS :: 1:1

PROCESS : THREADS :: 1: MANY

THREADS IN JAVA

JAVA HAS EXCELLENT BUILT-IN
SUPPORT FOR MULTI-THREADING

TO GET SOME CODE TO RUN ON A DIFFERENT THREAD (I.E. SIMULTANEOUSLY WITH THE MAIN THREAD)..

SIMPLY USE SOME BOILERPLATE JAVA CODE, AND YOU ARE ALL SET

BUT - WRITING MULTI-THREADED CODE IS COMPLICATED BECAUSE THREADS CAN INTERACT WITH OTHER IN SURPRISING WAYS

FOR INSTANCE TWO THREADS MIGHT BOTH CHANGE THE VALUE OF A VARIABLE SIMULTANEOUSLY, AND STRANGE BUGS COULD RESULT

CONCURRENCY IS COMPLICATED