Unit 11 | Parallel instruction = ILP   (using datapath)

2 ways to implement; last week is pipeline: 5 stages,
(software)   ↘ combine multiple instructions,
          together to execute parallel → take advantage,
          of multiple hardware.
    ⇒ to improve CPI
  ✦ Will also encounter data hazard prob & branch prob.

                                            stall & wait
    Data path ; data hazard ⟨   forward.
                                            reorder the instr
                                                        (called
                                                         speculation
    control hazard → predict first (in 2nd)
    (branch)   method)

Multiple issues (alternative of pipeline)

2 ways: software (static) , hardware (dynamic)
                    guess
    Speculation only occurs or branch command
                  ↙   ↘
    software way   hardware way.

Dynamic (hardware way)
    Reservation Buffer: hold registers until data
        dependency resolved & pass to commit.
                              inside func unit
several sets
    ⎧ instruction A   instruction B ⎫
    ⎪ reservation buffer   reservation buffer ⎪ pass to
    ⎨   :   ⎬   commit
    ⎩   ⎭   unit
                                          ⟶ (reorder buffer).

Branch comd. → speculation → static
(guess) → dynamic.

static   OS. }
dynamic: CPU. } → manage the