Hardware Labs
Introduction

• In the hardware lab you will:
  – Construct logic circuits on breadboards and test them
  – Design logic circuits and implement them using
    • Logic gates (SSI) and counter chips (MSI) logic
    • Memory devices (VLSI)
    • Programmable array logic (PAL) type devices – specifically Generic array logic (GAL)
Introduction

• In the labs you will make use of the self-contained Prototyping Box

• Contains:
  – Breadboard to build the circuits on
  – A power supply (PSU) – 5V
  – Clock signal (square wave) generator
  – Switches
    • Conventional push switches
    • Ones giving logic outputs for input to circuits
  – LEDs and displays for showing outputs
Prototyping Box

- PSU
- Power strip
- Clock
- Push switches
- Breadboard
- LED Displays
- GND (0V)
- V_{cc} (5V)
- 8 Logic switches
Breadboard

Horizontal strips used to distribute $V_{cc}$ (5V) and GND (0V)

Vertical five hole strips used to connect up components
DIL Package

14-pin Dual in Line (DIL) package. 74HC00 device contains 4, 2-input NAND Gates where:
   74 identifies the series
   HC identifies the technology
   00 identifies the function

Pin numbering – White dot indicates pin 1. Numbering increments as we move in an anticlockwise direction around the package

For 14(16) pin packages, pin 7(8) is usually GND (0V) and pin 14(16) $V_{cc}$ (5V). However, there are exceptions!
Wiring