CS F364
Design & Analysis of Algorithms

ALGORITHMS - COMPLEXITY

Non-Deterministic Computation

- Certificate Verification Model

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Non-Deterministic Algorithms - Characteristics

- Observations:
  - When does a non-deterministic algorithm work?
    - OR When does it fail?
  - How much time does it take?
    - OR does **Choose** do an exhaustive search?
- Ground Rules:
  - When a non-deterministic algorithm returns 1 it is correct.
  - When it returns 0 it may be incorrect

ND Computations – Alternative Perspective

- A non-deterministic algorithm verifies a "certified solution" if one is presented.
  - Example 1: (NDSearch)
    - …
    - ind = *choose(0, len-1)*;   // ind is a certificate
    - if (*A[ind]==k*) return 1   // verification
    - …
  - Example 2: (NDSAT)
    - …
    - for(j=0; j <len; j++)
          X[j] = *choose(0, 1)*;   // (values) X is a certificate
    - if (*evaluate (E, X) == 1*)   // verification
    - …