



College of Information Studies

University of Maryland Hornbake Library Building College Park, MD 20742-4345

Cloud Computing

Session 35

INST 346

Technologies, Infrastructure and Architecture

Goals for Today

- Cloud Computing
- Analysis Team 9

Rent vs. Buy: Costs

- Hardware
- Software
- Networking
- Operations

Capabilities

- Availability
- Scalability
- Responsiveness
- Distributed
- Shared
- Lightweight front end

Considerations

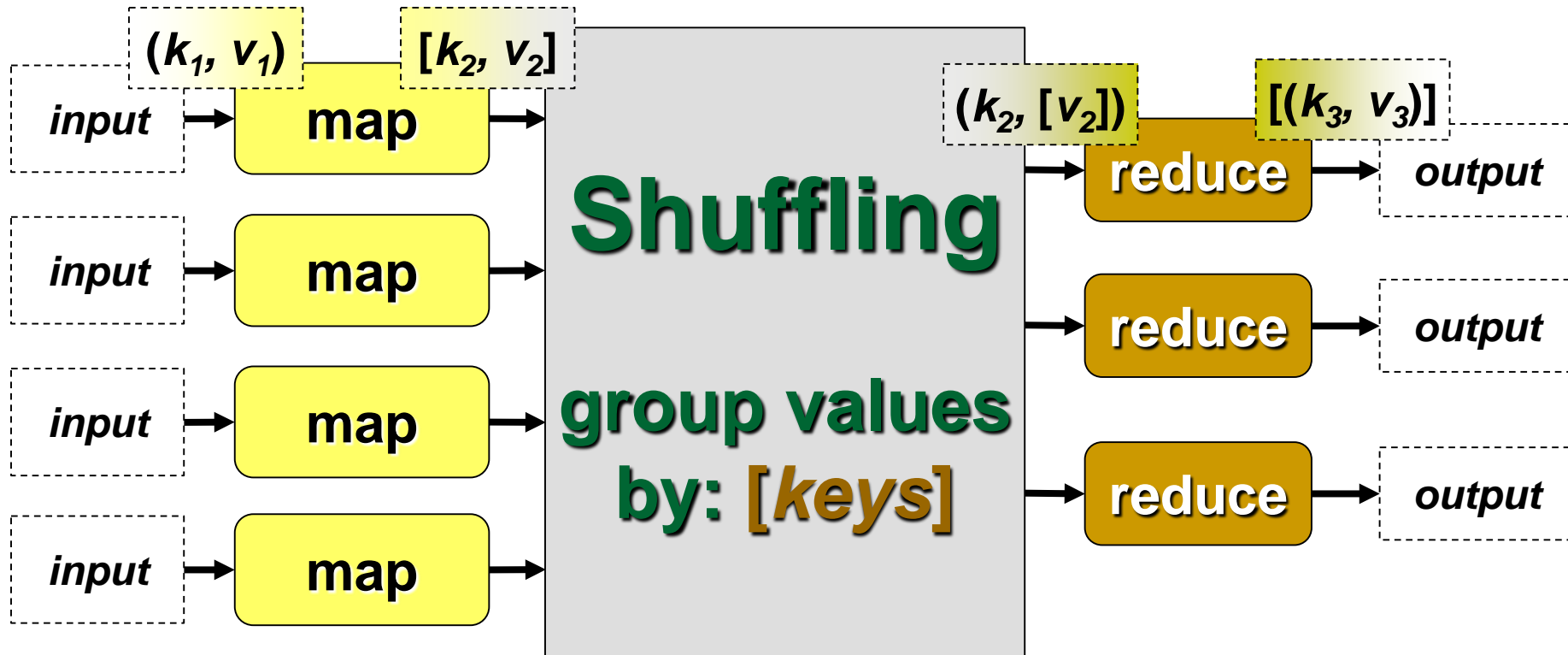
- Architectures
- Service Level Agreements (SLA)
- Security
- Jurisdiction
- Control

MapReduce Architecture (Hadoop)

(a) Map

(b) Shuffle

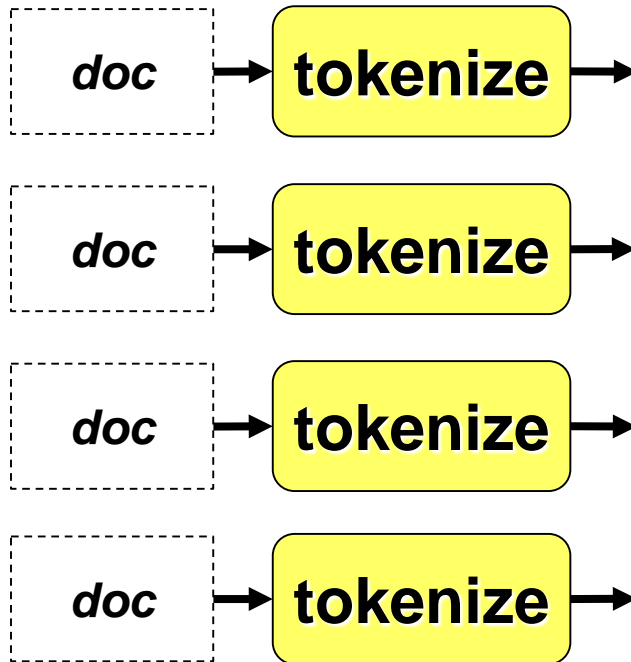
(c) Reduce



handles low-level details transparently

Standard Indexing

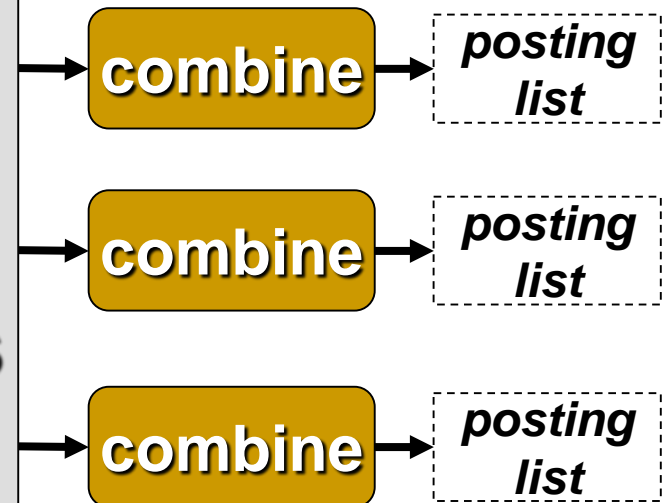
(a) Map



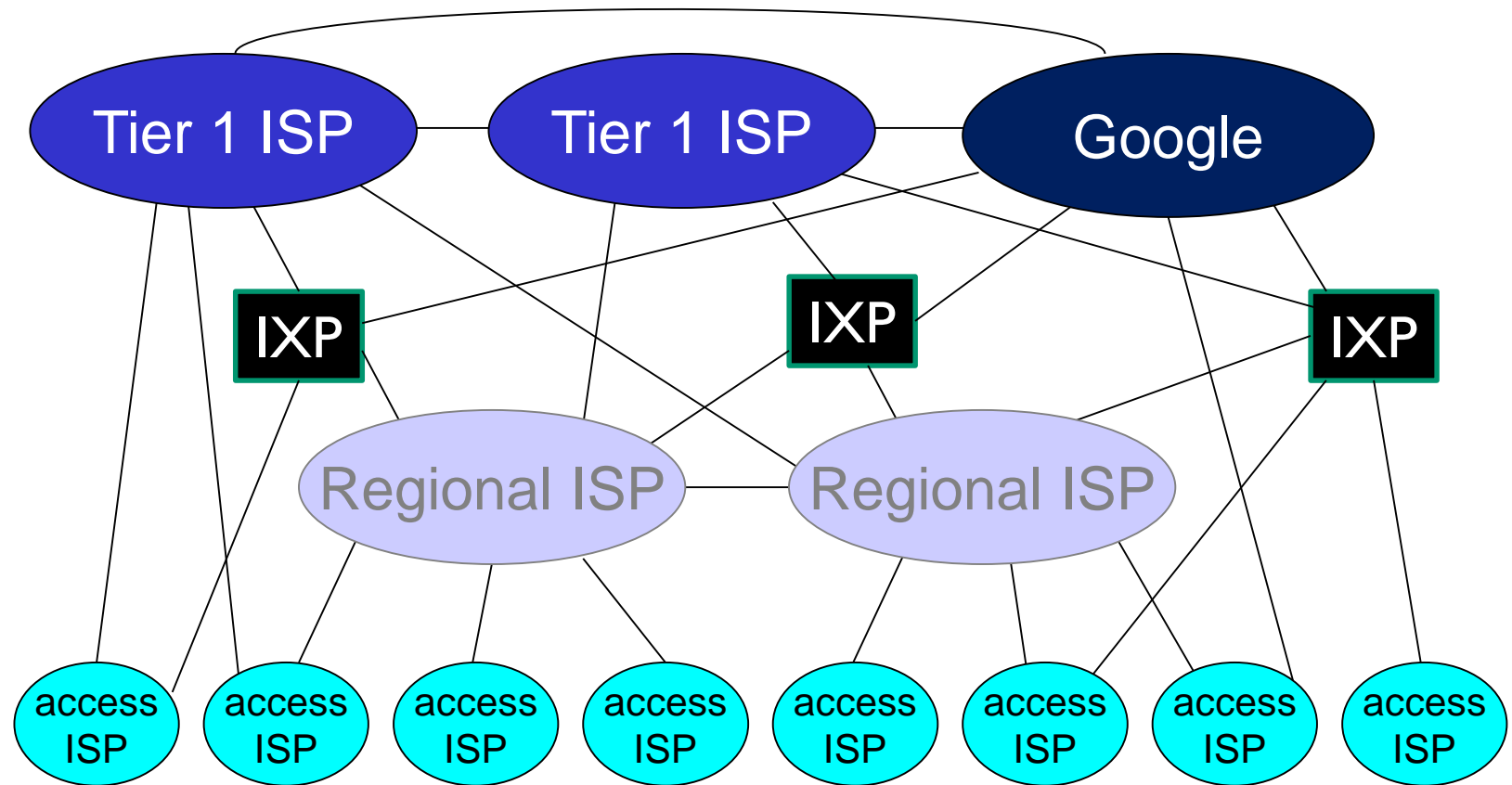
(b) Shuffle



(c) Reduce



Internet structure: network of networks



- at center: small # of well-connected large networks
 - “**tier-1**” **commercial ISPs** (e.g., Level 3, Sprint, AT&T, NTT), national & international coverage
 - **content provider network** (e.g., Google): private network that connects its data centers to Internet, often bypassing tier-1, regional ISPs

Content distribution networks

- *challenge*: how to stream content (selected from millions of videos) to hundreds of thousands of simultaneous users?
- *answer*: store/serve multiple copies of videos at multiple geographically distributed sites (*CDN*)
 - *enter deep*: push CDN servers deep into many access networks
 - close to users
 - used by Akamai, 1700 locations
 - *bring home*: smaller number (10's) of larger clusters in POPs near (but not within) access networks
 - used by Limelight

Case study: Netflix

