

# Image-based Modeling and Rendering

## 1. Introduction

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# Outline

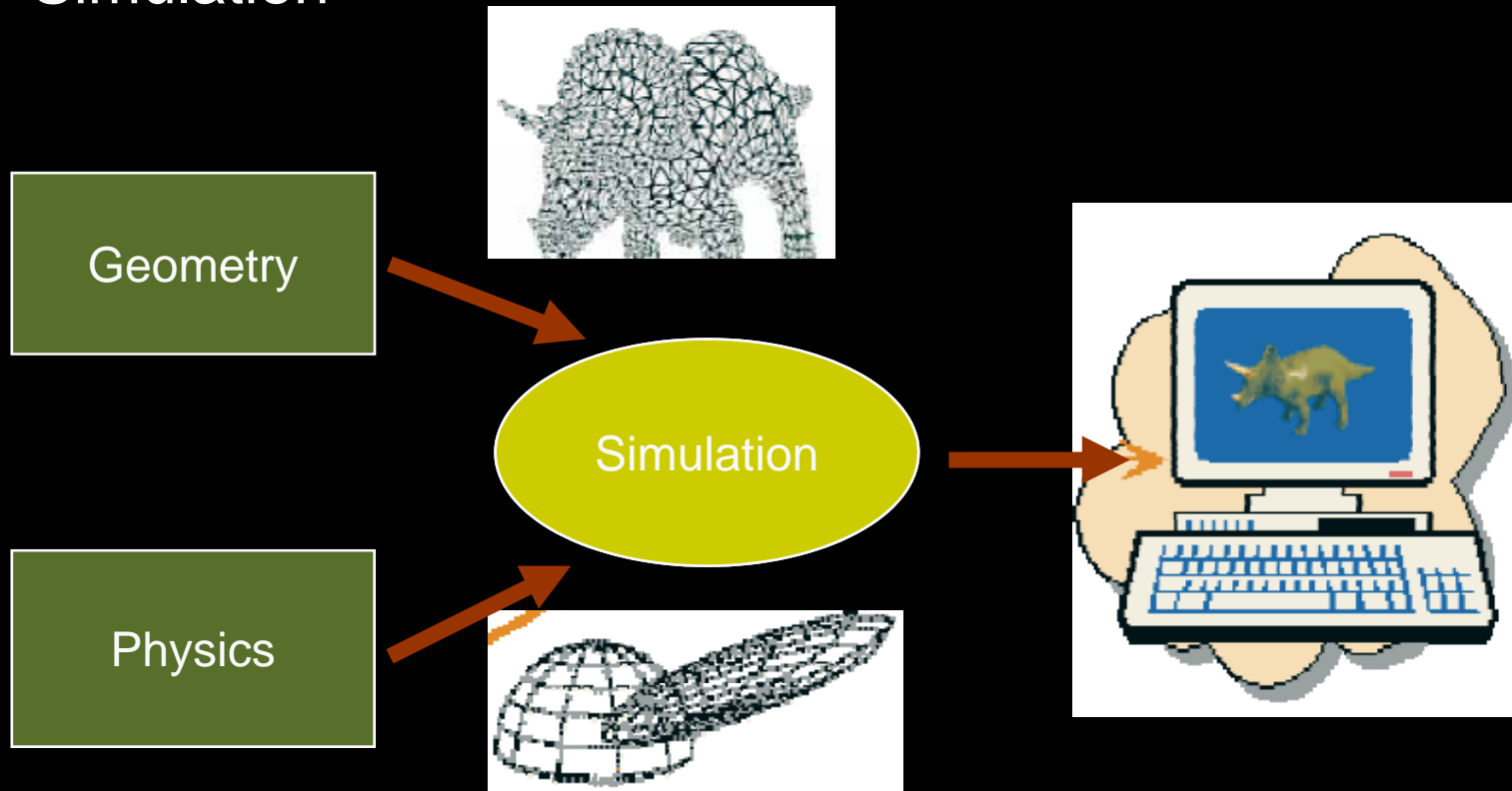
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- What're Image-based approaches?
- When should I use IBMR techniques?

Ref: SIGGRAPH'99 Course Notes "IBMR"

# Conventional 3-D Graphics

## Simulation



# Computer Vision

## Analysis

Images



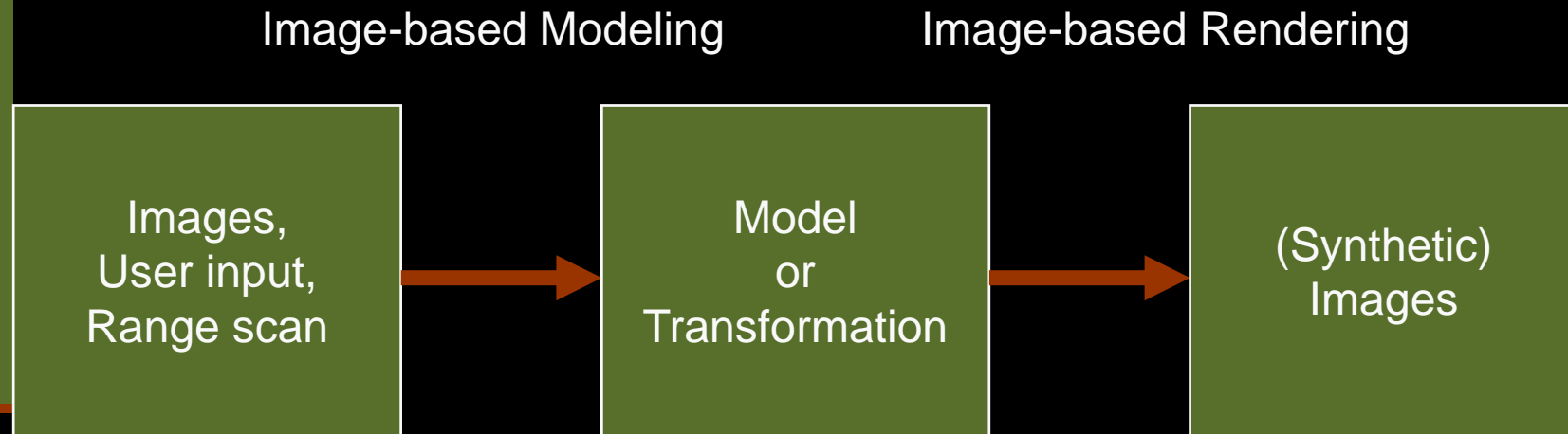
Analysis

Assumptions  
About Physics

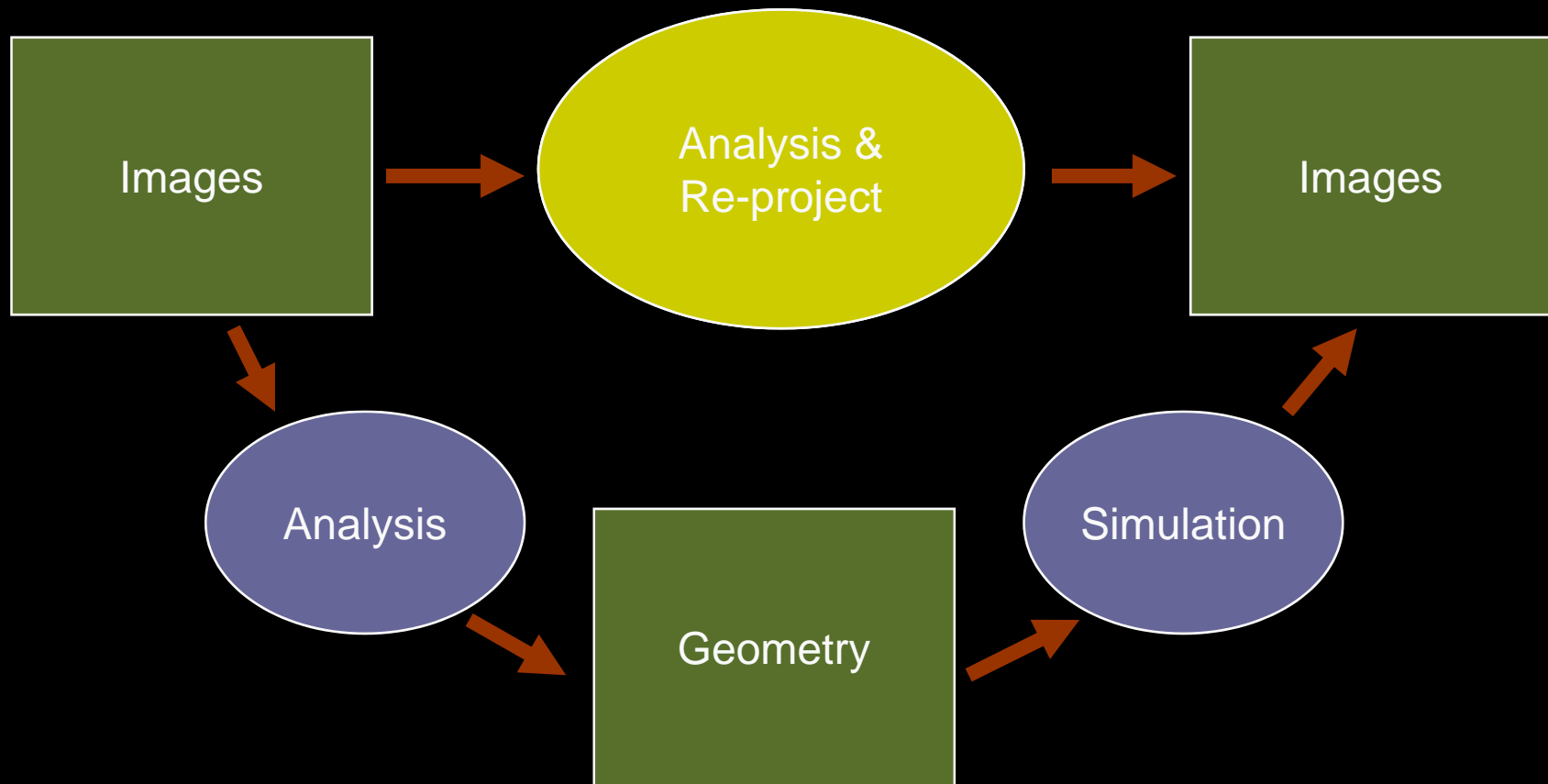


Geometry

# What's IBMR?



# The Image-Based Approach



# Image-Based Modeling

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- Images (photographs, renderings) are used to determine
  - Scene Appearance
  - Scene Geometry
  - Lighting
  - Reflectance Characteristics
  - Kinematic Properties
- Modeling scenes photo-realistically is easier

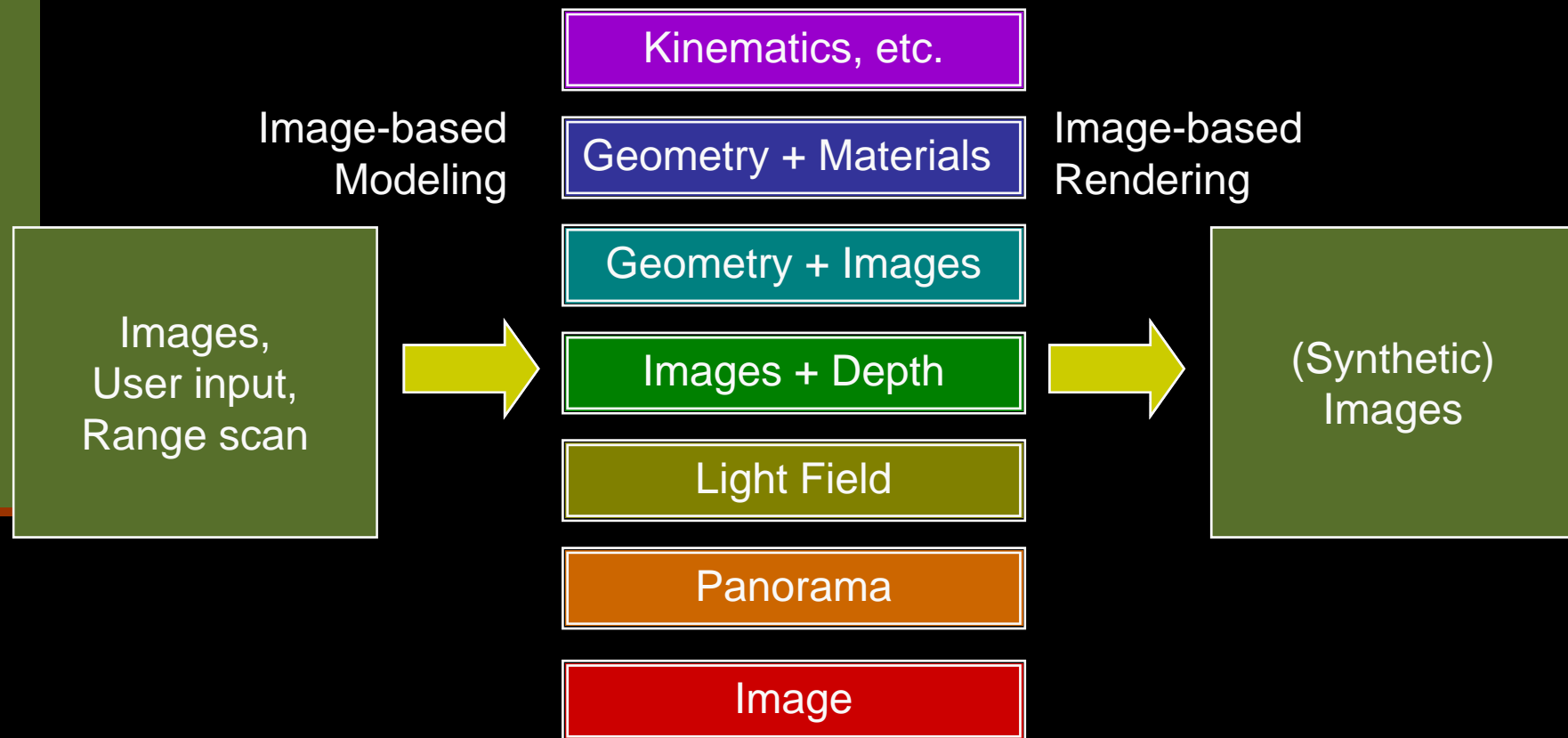
# Image-Based Rendering

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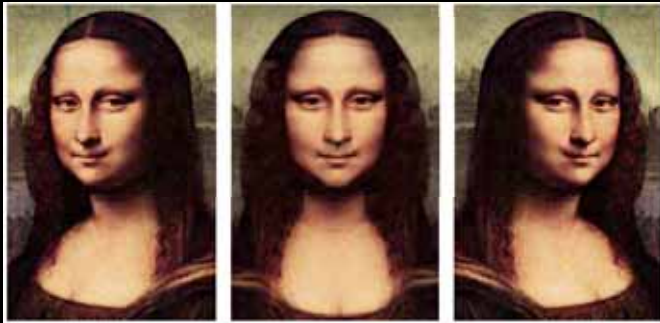
- Appearance in available views is used to determine appearance in novel views
- Not necessary to perform full illumination computations
- Rendering could be faster



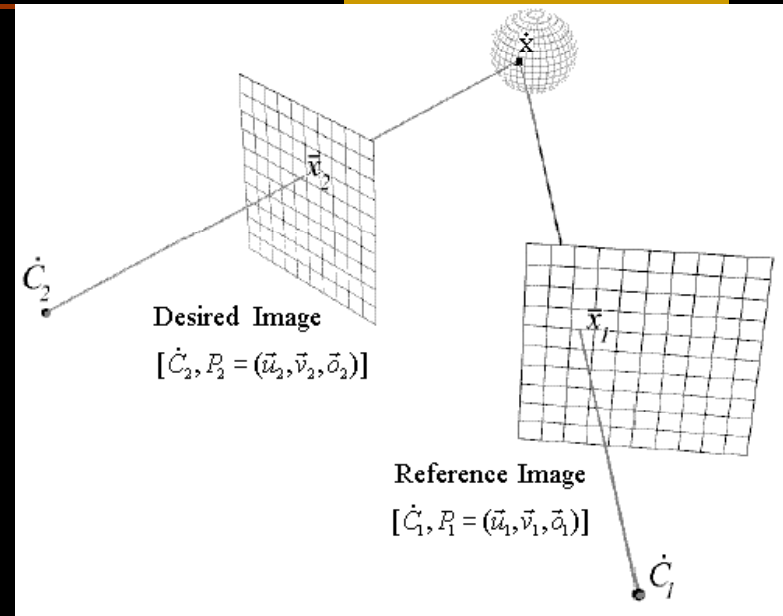
# The Spectrum of IBMR



# Image Warping/Morphing



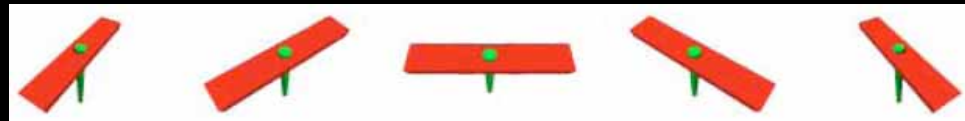
S.Seitz et al. "View Morphing", SIGGRAPH'96



2D image  
morphing



With 3D  
perspective  
transformation



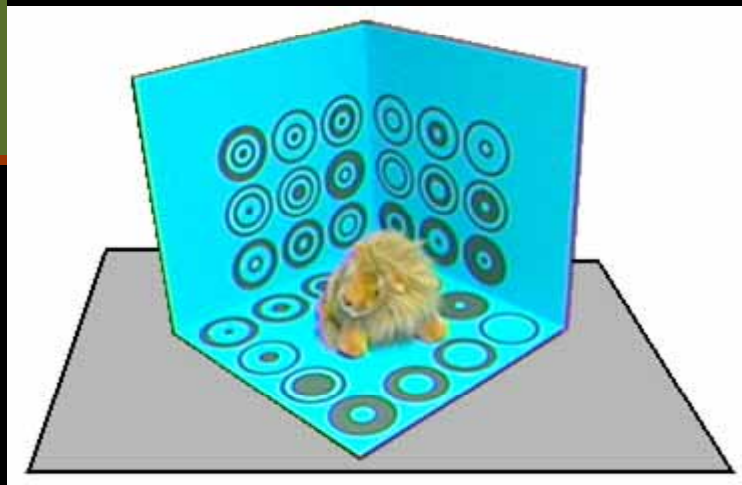
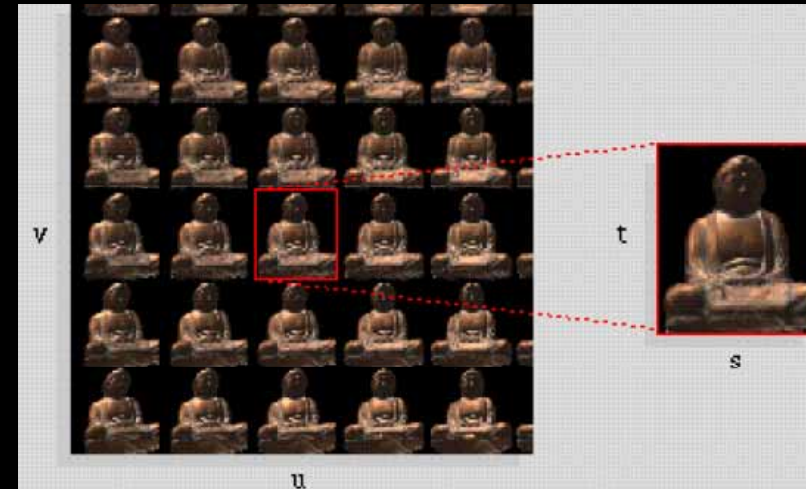
# Panorama



E.Chen, "QuickTime VR", SIGGRAPH'95

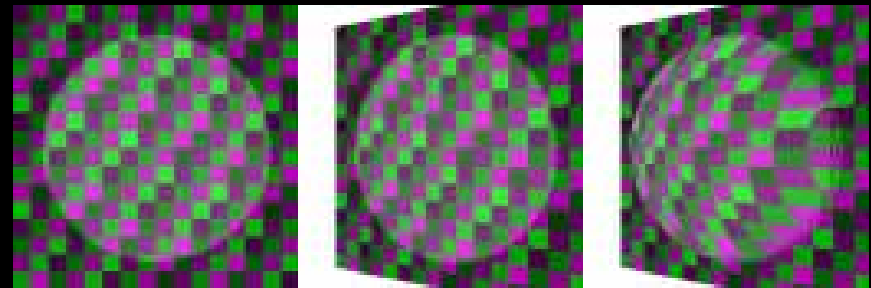
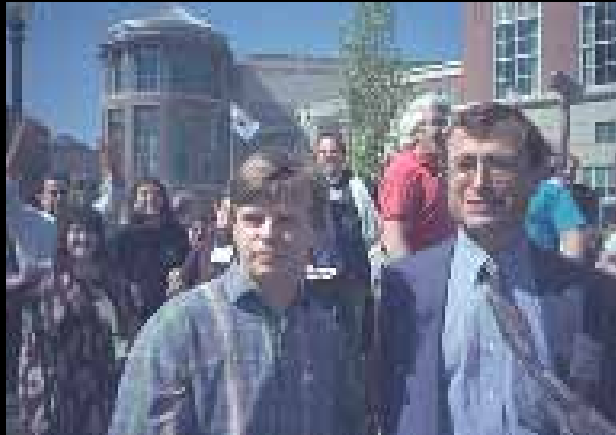


# Light Fields



S.Gortler et al. "The Lumigraph", SIGGRAPH'96

# Image + Depth



J.Shade et al. "Layered Depth Images", Proc. SIGGRAPH'98.

# The Spectrum of IBMR (cont.)

	<b>Movement</b>	<b>Geometry</b>	<b>Lighting</b>
Geometry + Materials	Continuous	Global	Dynamics
Geometry + Images	Continuous	Global	Fixed
Images + Depth	Continuous	Local	Fixed
Light Field	Continuous	None	Fixed
Panorama	Rotation	None	Fixed
Image (without view morphing)	None	None	Fixed

# Applications

- <http://www.virtualcamera.com/>
- Array of pictures taken onto same roll of film
- Playback achieves “frozen time” effect Array



[www.mvfx.com](http://www.mvfx.com)

**The Matrix,  
MANEX  
Entertainment**

# Why do we develop IBMR tech.?

	Geometry	IBR
Modeling	Difficult	Easy
Complexity	#triangles	#Pixels
Fidelity	Synthetic	Acquired

Ref: Prof. Chang, NTHU, IBR lecture notes.