15 / BOTTOM-UP EXPERIMENTATION

Amazon S3

A small service, a serious promise

What can be kept small when customers depend on the infrastructure?



Server racks, 2015. Industry context. Photograph: Carl Lender.
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Launching a focused storage service lets developers experiment. The provider must decide which features can wait and which service commitments must work from the start.

Andy Jassy and the AWS team | March 2006 • reconstructed launch decision

35-45 minutes to prepare / 75 minutes to discuss
Original public-source teaching case • First member edition • 1 November 2026

PRINCIPLED BUSINESS IN PRACTICE

Introduction

About Principled Business

Principled Business (PB) is a nonprofit organization that brings together business leaders to advance capitalism through education, relationships and action. It helps founders, executives and investors understand free enterprise, apply its principles in their organizations, and explain the contribution business makes to people's lives.

The PB manifesto grounds capitalism in individual agency, private ownership and voluntary production and trade. These commitments take practical form in everyday business decisions.

Bottom-up experimentation

PB recognizes that useful knowledge often emerges through local initiative and trial. Leaders must make room for experiments while defining the evidence and safeguards that govern further investment.

Amazon S3 connects bottom-up experimentation with dependable shared infrastructure. Developers can try new ideas more easily when they do not have to build every component themselves. The case asks how the provider can limit scope while preserving the reliability, access control and support needed for customers to use the service responsibly.

PB presents this case to make the principle usable in a real business decision. Your recommendation should connect the principle to a workable policy, account for the people affected, and identify evidence that could change your mind.

What you will learn

01 Distinguish a small feature set from a weak service promise.

02 Calculate usage-based revenue and contribution using explicit cost assumptions.

03 Define operational gates for a limited infrastructure launch.

> **Apply it to your own business**
> What can your organization offer in a simpler first version, and which promises must already be dependable because customers will build on them?

Source: About Principled Business; Capitalists for Capitalism Manifesto, Section 2: Bottom-Up Experimentation.

NOTES FOR STUDENTS AND TEACHERS

Using this case study

This packet includes the case, exhibits, worksheet, sources, answers and teaching notes. Allow 35-45 minutes to prepare and 75 minutes for discussion. Have a calculator or spreadsheet available.

Pages	What to use and when
4-8	Decision, evidence, exercise and alternatives. Read before discussion.
9	Decision worksheet. Complete before reading the answers.
10	Sources and reading notes. Check the evidence and its limits.
11-12	Worked answers, outcome and teaching plan. Read after deciding.

For students

Read once to identify the decision, then work through the exhibits. Separate historical facts from the invented classroom exercise. Use the case's decision boundary; write down assumptions when evidence is missing. Complete the calculation and worksheet on page 9. Be ready to defend your recommendation and the strongest objection to it.

For individual study, decide before turning to pages 11-12. Compare your reasoning with the worked analysis and write a short reflection on what you would change. Choose one action to try in your own organization.

For teachers and discussion leaders

Read the full packet and timed plan before teaching. Assign pages 1-10 first and reveal the final two pages after students commit to a choice. Record the alternatives, evidence and disagreements on the board.

Keep availability, durability and security conceptually distinct. The historical availability figure is a design requirement in the launch announcement, not evidence of actual performance or a modern contractual service level.

> **How to assess the work**
> Look for a clear choice, accurate analysis, stated assumptions, attention to affected people, a fair objection, and an implementation plan with an owner and review point. Assess reasoning rather than agreement with the historical decision.

MARCH 2006 • THE SCOPE OF A FIRST OFFER

The decision

Amazon’s S3 launch announcement described an Internet storage service with a deliberately limited feature set and usage-based pricing. The service offered developers a building block for storing and retrieving data rather than a complete application. [W1]

Take the AWS team’s position as it defines the first public offer. It could launch a focused storage service, hold back for a broader feature set or limit use to a small set of customers while learning more. The choice affects both speed of learning and the people who may begin relying on the service.

A small product can carry a large obligation

A customer’s experiment may be reversible; the loss of its stored information may not be. Limiting scope should therefore be different from treating all service qualities as optional. Decide which promises must be established before customers are admitted and which features can be added after observing use.

The exercise uses the publicly announced launch tariff to make the economics concrete. It does not claim access to private pre-launch budgets or internal reliability measurements.

> **Decision boundary**
> Define the service, admission criteria and operational gates. Do not assume that a later, mature cloud platform already exists or that a minimal feature set permits avoidable failures.

THE BUSINESS LOGIC

A building block for other people’s ideas

Reduce the cost of trying

A usage-based service can reduce the upfront commitment required to test an application. A customer can begin at a smaller scale and expand if demand appears. The value depends on understandable pricing, predictable behavior and a practical way to handle data and access.

Keep the promise narrow and clear

A focused service is easier to explain and operate when its boundaries are explicit. It should state what it does, what it does not yet support and what customers must handle themselves. Ambiguity can turn a small feature omission into a major operational misunderstanding.

Reliability is not one number

Availability concerns access when needed. Durability concerns preservation of stored data. Security concerns authorized use and protection against misuse. A favorable result on one dimension cannot establish the others. The launch plan needs separate evidence and ownership for each relevant commitment.

Experiments should have observable limits: customer cohort, workload, support capacity and the conditions that trigger a pause. An operator can learn from usage while still preparing incident response, recovery procedures and communication before problems occur.

> **The design question**
> Which uncertainty can safely be learned through customer use, and which must be resolved before a customer entrusts important work to the service?

EXHIBIT 1 • HISTORICAL LAUNCH INFORMATION

The first service boundary

Announced feature or requirement [W1]	Management question
A deliberately minimal feature set	Which customer task can the first version serve completely?
Storage and transfer charged by use	Can customers understand and predict the bill?
Access controls for stored objects	Who is responsible for configuring and verifying access?
99.99% availability as a design requirement	What evidence and operating response support the intended service level?

Do not turn a target into evidence

A published requirement states what the design is intended to achieve. It does not demonstrate what happened in production. A launch review should examine measured behavior, failure handling and the team’s ability to communicate when the service falls short.

A useful early customer

Choose a customer whose workload can reveal important operational behavior and whose needs fit the narrow offer. Define what information the team will collect without exposing customer data unnecessarily. A diverse enough cohort can reveal problems a single internal workload would miss.

> **Boundaries matter**
> The exercise’s availability arithmetic is only a way to interpret a percentage over time. It does not measure the consequences of downtime, data loss or unauthorized access.

EXHIBIT 2 • CLASSROOM MODEL WITH HISTORICAL TARIFF

Usage, cost and availability

The March 2006 announcement priced storage at $0.15 per GB-month and data transfer at $0.20 per GB. [W1] Use those historical rates below. Every workload and cost assumption is invented; the model does not describe Amazon’s actual margins.

Monthly input	Base	Larger cohort
Stored GB-months	100,000	200,000
Transferred GB	200,000	400,000
Storage cost per GB-month	$0.08	$0.08
Transfer cost per GB	$0.10	$0.10
Support cost	$10,000	$10,000
Other fixed operating cost	$15,000	$15,000

Ignore taxes, capital expenditure and other costs. Assume the stated unit costs and fixed support bill hold in both scenarios. For the availability calculation only, use a 30-day month with 43,200 minutes and count all unavailable minutes equally.

01 Calculate revenue and operating result for each cohort.

02 If support cost doubles for the larger cohort, what is the revised result?

03 How many unavailable minutes correspond to 99.99% availability in the simplified month? Compare 99.9%.

04 Which assumptions require operational evidence before expansion?

ALTERNATIVES • IMPLEMENTATION • ASSIGNMENT

Launch a promise you can keep

Path	Potential benefit	Risk to address
Focused public service	Learn from varied real use with a clear product boundary.	Uncontrolled load or misunderstood responsibilities.
Broader feature launch	Serve more use cases from the start.	More complexity, delay and untested interactions.
Limited external cohort	Observe use and support needs within a defined scale.	A narrow sample may miss important workload variation.

Your assignment

01 Choose a launch scope and the first customer task.

02 Separate mandatory service conditions from features that can wait.

03 Set admission, monitoring and pause rules with named owners.

04 Write an incident communication promise and an expansion decision rule.

Include how the team will learn from customers without asking them to bear undisclosed risks. Specify a review of both financial performance and service delivery. A profitable cohort that repeatedly misses its essential promise is not ready to expand.

> **A useful challenge**
> “We can fix it after launch” is incomplete. Identify what could fail, who would bear the consequence and whether the failure can actually be reversed.

WORKSHEET • COMPLETE BEFORE READING THE TEACHING NOTES

Your decision

Write as the decision-maker. Use the historical evidence and the classroom model for their stated purposes. A recommendation needs a boundary, an owner and a test.

My recommendation and the principle it puts into practice

The calculation or evidence that matters most; its main limitation

Who bears the risk, and how their choice or voice is protected

The strongest objection and my response

First action, accountable owner, review date and stop/change trigger

EVIDENCE • METHOD • LIMITS

Sources and reading notes

A reconstructed launch-scope decision based on the 14 March 2006 announcement. Historical prices are identified explicitly. All workload, cost and scenario figures are invented and are not Amazon’s accounts.

W1 Amazon, Amazon Web Services Launches, 14 March 2006

S3 feature scope, design requirements, launch prices and named early applications.

Open source document →

W2 Principled Business, Capitalists for Capitalism Manifesto

Bottom-up experimentation provides the interpretive framework.

Open source document →

How to read the evidence

Read the announcement as a statement of the intended service. It is not an independent reliability audit. The case does not import later S3 features, modern durability figures or current pricing into the 2006 decision.

All quantities in the classroom exercise are invented unless explicitly identified as historical. The models omit factors deliberately for discussion; they are not company forecasts. Photographs are documentary context, with dates and licenses on the cover.

Original Principled Business teaching material. No company approval or affiliation with Harvard Business School is implied. No private interviews or unpublished company records were used. Public sources checked 1 November 2026.

TEACHING NOTES • READ AFTER COMPLETING THE DECISION

Worked analysis

Monthly economics

Result	Base	Larger cohort
Storage revenue	$15,000	$30,000
Transfer revenue	$40,000	$80,000
Total stated cost	$53,000	$81,000
Operating result	$2,000	$29,000

Base cost is $8,000 storage + $20,000 transfer + $10,000 support + $15,000 fixed operating cost. Larger-cohort cost is $16,000 + $40,000 + $10,000 + $15,000. If its support cost doubles, the larger cohort's result falls by $10,000 to $19,000.

Interpret the percentage

At 99.99% availability, the unavailable share is 0.01%, giving 43,200 × 0.0001 = 4.32 minutes in the simplified month. At 99.9%, it is 43.2 minutes. This arithmetic says nothing about whether downtime occurs during a critical customer event or affects all users equally.

A bounded launch recommendation

A limited, varied customer cohort can test usage and support assumptions while the team validates essential service conditions. Expansion should require evidence of dependable operation, understandable billing and a working incident response. The base case's small financial surplus also makes omitted costs important.

> **Common errors**
> Do not confuse GB stored with GB transferred, apply a modern tariff, treat an availability target as measured performance, or use availability to infer data durability or security.

TEACHING NOTES • READ AFTER COMPLETING THE DECISION

Outcome and teaching plan

What happened next

Amazon launched S3 on 14 March 2006 with a limited storage feature set and usage-based pricing. The announcement named early applications including the University of California, Berkeley's Stardust@Home project. Those examples establish intended use; they do not independently verify long-run economics or reliability. [W1]

A 75-minute discussion

Minutes	Facilitation plan
0-10	Choose a launch scope and define the essential promise.
10-25	Separate features, availability, durability and security.
25-40	Calculate both cohorts and interpret the availability percentages.
40-55	Set admission, incident and expansion gates.
55-65	Reveal the launch and discuss what an announcement can establish.
65-75	Apply the minimum-promise test to a new product or process.

> **Closing question**
> What can you simplify in a first release without weakening the promise customers must be able to rely on?

Assess the decision at its stated boundary. Later success cannot prove the original choice was sound; later failure cannot, by itself, prove it was unreasonable.