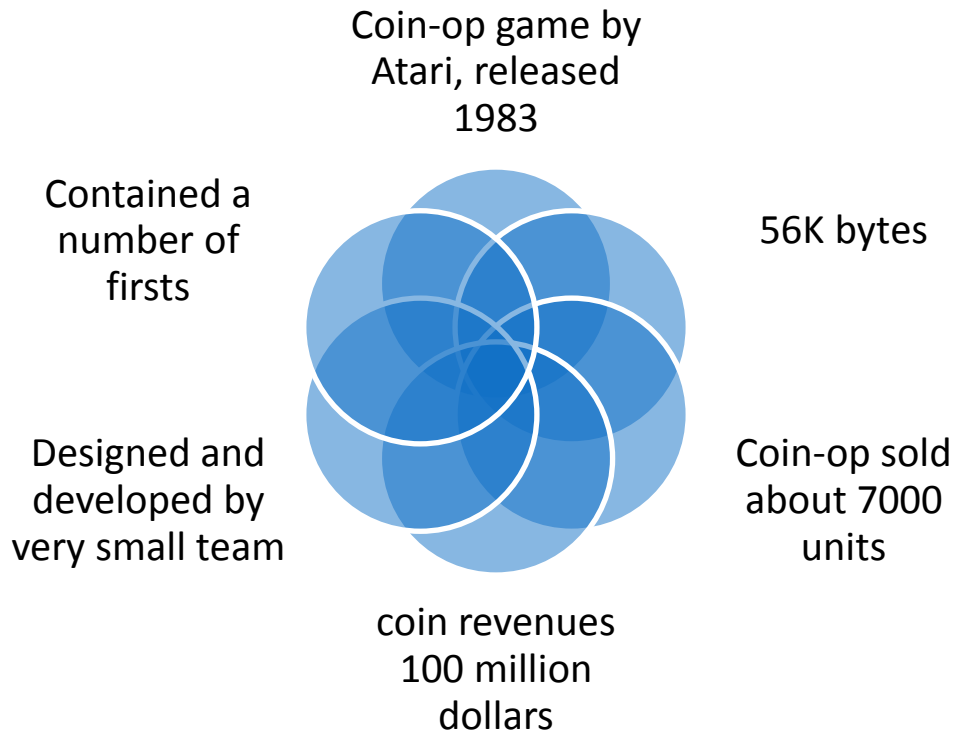


Classic Game Postmortem: Crystal Castles

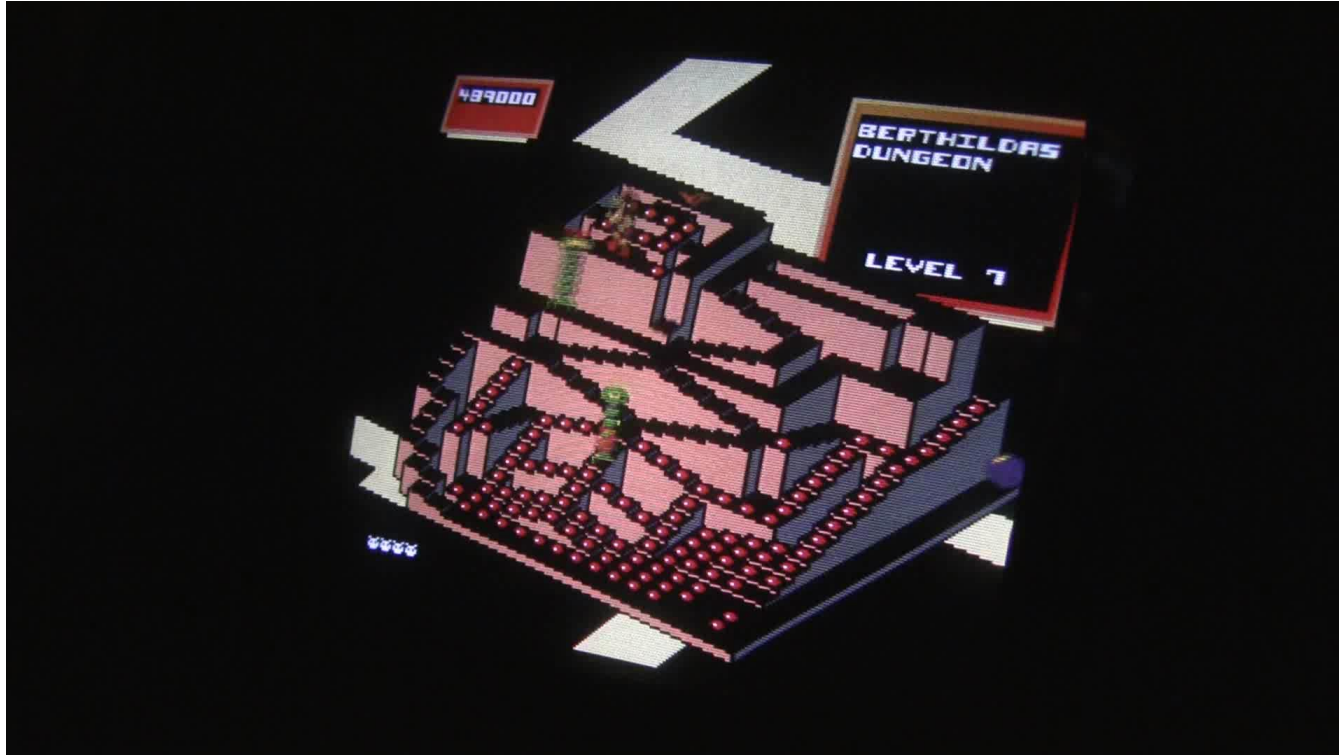
Franz Lanzinger

30 years of Bentley Bear, Trees and Bees

What is Crystal Castles?



Video of Crystal Castles Gameplay



Highlights of Today's Talk

- Live music performance
- Video of advanced play by Mark Alpiger
- Amazing videos from the early eighties
- Rare scans of original sketches and documents

History

- Personal background before Atari
- How I got hired at Atari
- Development of Crystal Castles
- Classical Music



Personal Background

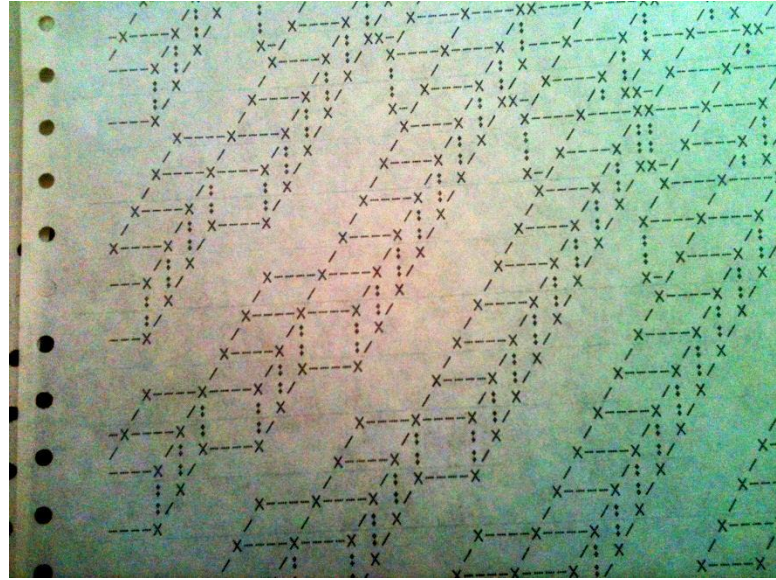
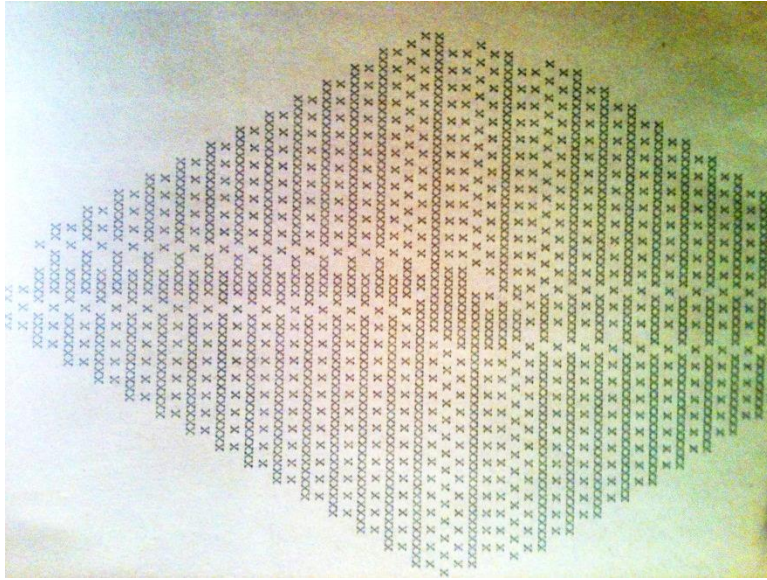
- Born and raised in Austria
- Math major at Notre Dame

First code: PL/I on IBM 360

```
1160 PR=PZ; S=S+PR;
1170 END HOLE;
1180 Z(*,2)=Z(*,2)+Z(*,1);
1190 DO I=1 TO 8;
1200 IF Z(I,3)<Z(I,1) THEN DO;
1210 Z(I,3)=Z(I,1); ZR(I,3)=C1; END;
1220 IF Z(I,4)>Z(I,1) THEN DO;
1230 Z(I,4)=Z(I,1); ZR(I,4)=C1; END;
1240 END; END;
1250 E4: PUT SKIP EDIT(C1)(F(4));
1260 PUT EDIT(' ')(A);
1270 PUT EDIT(B(2),B(3),B(4),B(5),B(6),B
1280 PUT EDIT(Z(1,1),Z(2,1),Z(3,1),Z(4,1
1290 PUT EDIT(Z(5,1),Z(6,1),Z(7,1),Z(8,1

1300 E1: END;END;END; PUT SKIP LIST(' ')
1310 PUT SKIP(2) LIST(' ');
1320 PUT SKIP EDIT('PROPERTY','AVG','MAX
1330 PUT SKIP LIST(' ');
1340 T: FORMAT(A(15),E(18,5),F(5),E(13,5
1350 PUT SKIP EDIT('MULTIPLICITY',Z(1,2)
1360 PUT EDIT(ZR(1,4),Z(1,4))(F(5),E(13,
1370 PUT SKIP EDIT('LENGTH OF PATH',Z(2,
1380 PUT EDIT(ZR(2,4),Z(2,4))(F(5),E(13,
1390 PUT SKIP EDIT('# OF SPACES',Z(3,2),
1400 PUT EDIT(ZR(3,4),Z(3,4))(F(5),E(13,
1410 PUT SKIP EDIT('# OF HOLES',Z(4,2),
1420 PUT EDIT(ZR(4,4),Z(4,4))(F(5),E(13,
1430 PUT SKIP EDIT('DIST FR ORIGIN',Z(5,
1440 PUT EDIT(ZR(5,4),Z(5,4))(F(5),E(13,
1450 PUT SKIP EDIT('SIZE',Z(6,2)/C2,ZR
1460 PUT EDIT(ZR(6,4),Z(6,4))(F(5),E(13,
1470 PUT SKIP EDIT('SPACES PER HOLE',Z
```


Graphics at ND, 1973 - 1977



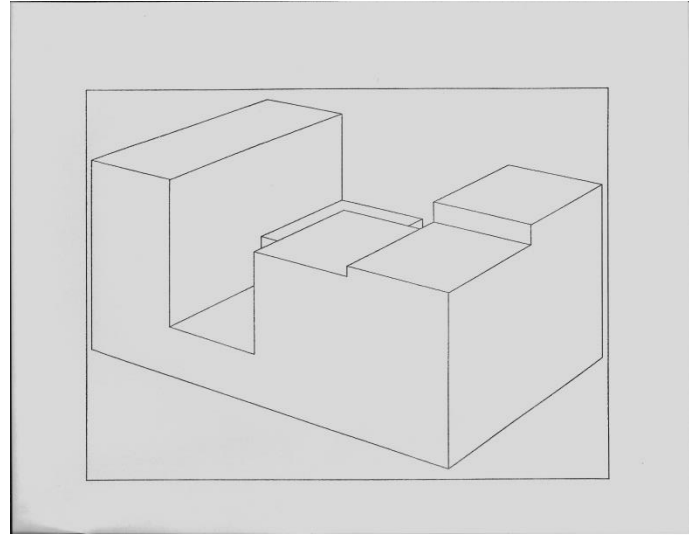
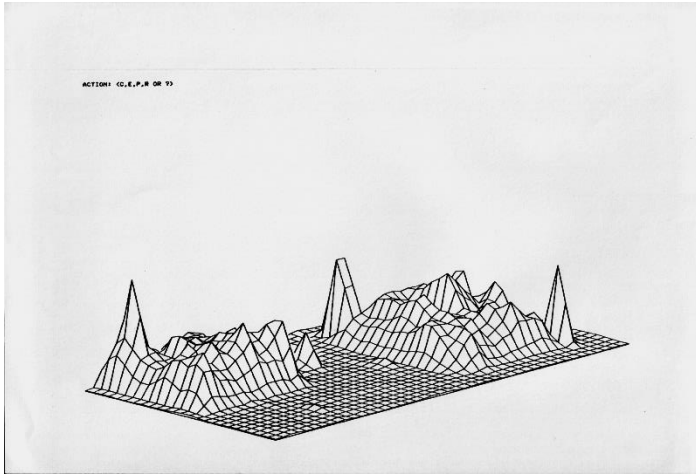
Systems Control

- First full-time job
- 4014 terminal
- Arpanet

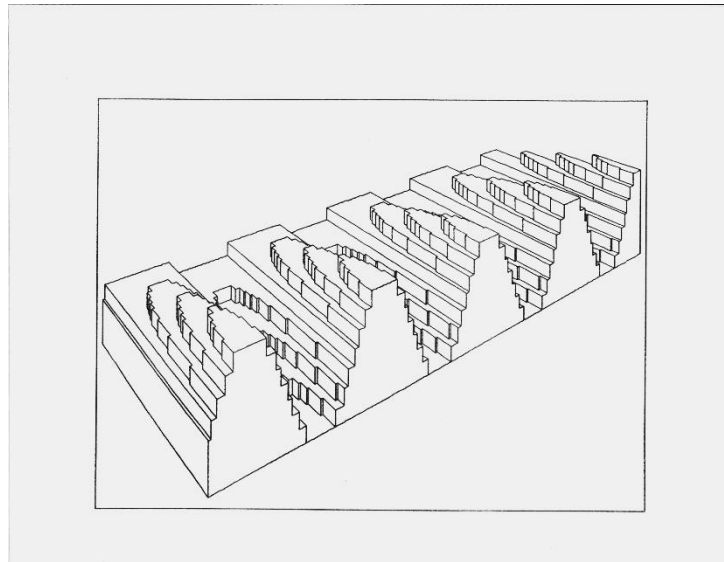
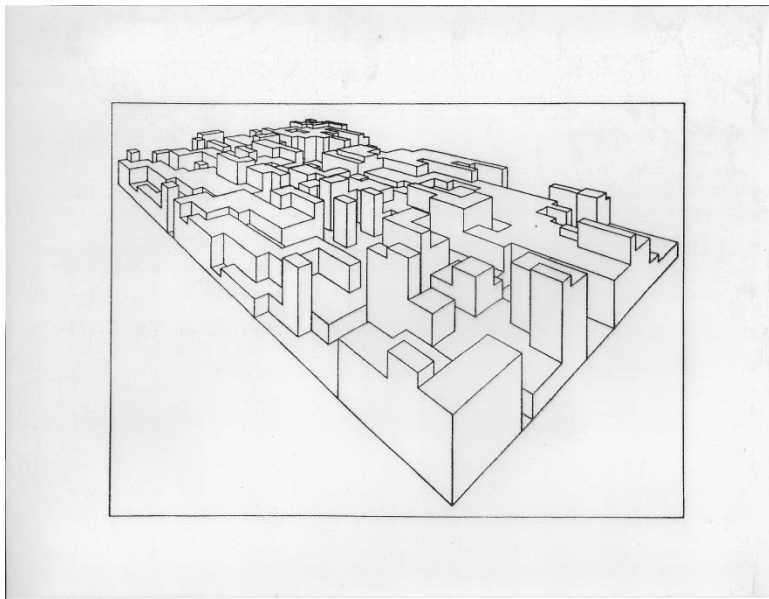


Systems Control Graphics

- Graphics at Systems Control
- Precursor to Crystal Castles mazes

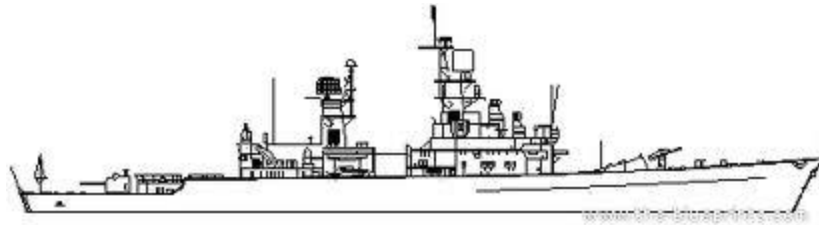


Vector hidden line removal



Artificial Intelligence

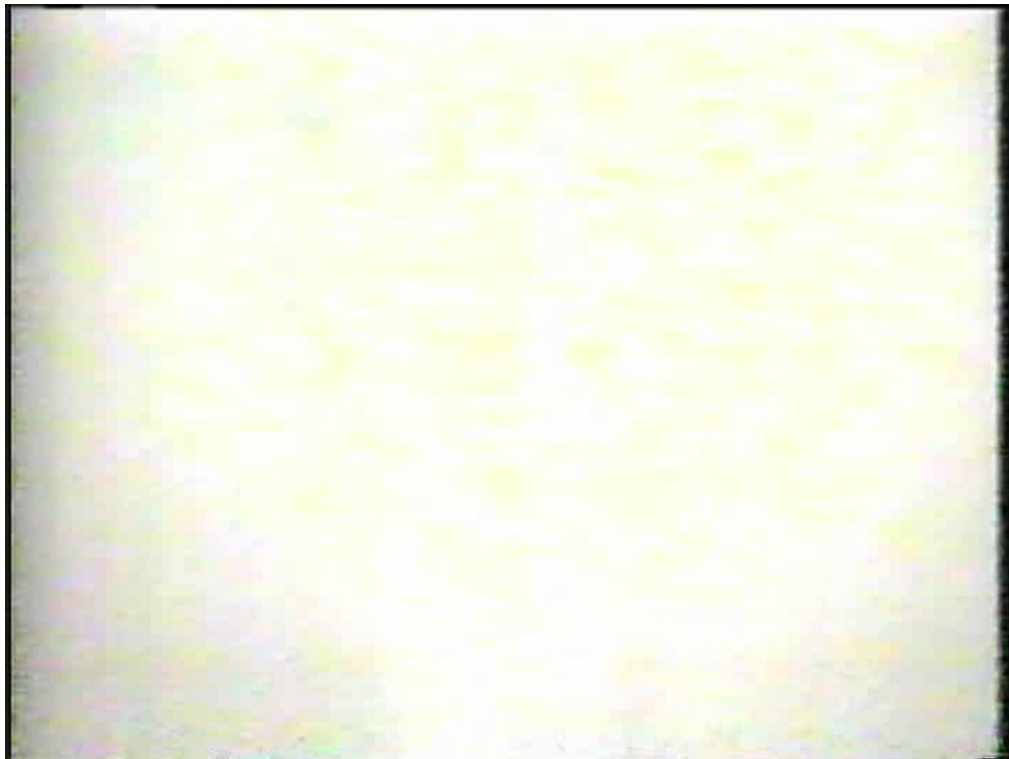
- Advanced Information and Decision Systems
- Research in Artificial Intelligence
- Learned to program in Z80 assembly language



Arcades in 1981

- Video shot at Chuck E Cheese arcade, 1981
- Into the Valley of the Space Invaders
- Broadcast in 1981

Arcades 1981



Mountain View Arcade Group

- Mark Robichek, Eric Ginner and Sam Mehta
- Desiree McCrorey, Brian McGhie
- Centipede World record, 1981
- FXL, MAR, EDG, SSM, DES, BBM

Chicago 1981

- Centipede World championship Chicago, 1981
- Eric Ginner finished 1st, Sam Mehta 2nd
- Franz 26th
- Video of News coverage

Centipede World Championship, 1981



Coin-op, the real Atari

Partial list of games developed internally at Atari Coin-op

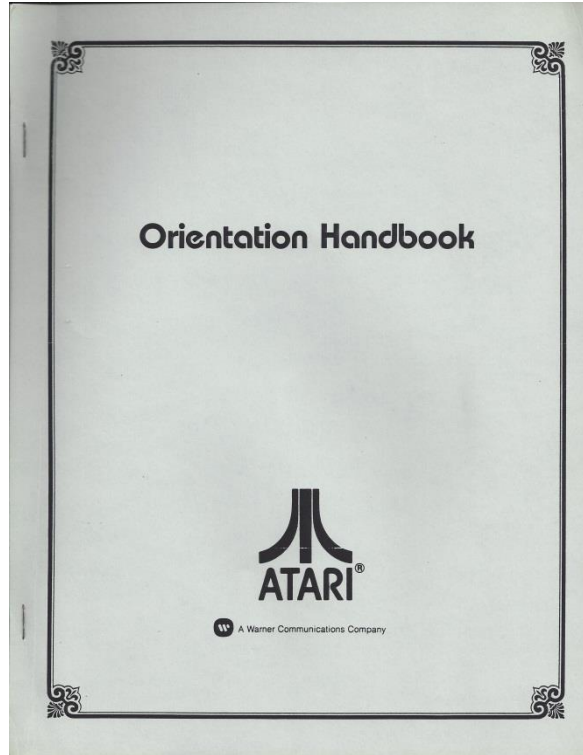
720, APB, Area 51, Asteroids, Asteroids Deluxe, Battlezone, Black Widow, Breakout, Centipede, Cloak & Dagger, Crystal Castles, Cyberball, Fire Truck, Firefox, Gauntlet, Gauntlet II, Gauntlet Legends, Gravitar, Hard Drivin', I Robot, Indian Jones, Indy 4, Indy 800, Klax, Liberator, Lunar Lander, Major Havoc, Marble Madness, Millepede, Missile Command, Night Driver, Paperboy, Peter Pack Rat, Pit-Fighter, Pong, Qwak!, Rampart, Red Baron, Roadblasters, S.T.U.N. Runner, SF Rush, Skull & Crossbones, Space Duel, Space Lords, Sprint, Star Wars, Stunt Cycle, Super Sprint, T-Mek, Tank, Tempest, War Final Assault, Warlords, Wayne Gretzky's 3D Hockey, Xybots.

Getting hired into coin-op



- Brian McGhie at Golfland
- Interviewed with Mike Albaugh
- Centipede world record

Atari Employee Handbook



Atari Mission

ATARI MISSION STATEMENT

This Mission Statement is to be used as a guide to the mission of Atari during the period that an official Mission Statement is being drafted.

Atari is an innovative consumer electronics manufacturing company producing entertainment products and personal/home computers. We are committed to:

- Maximizing growth opportunities to achieve our long-range goal of becoming the leading consumer electronics company.
- Profitability as measured by return on investment (ROI) and net earnings.
- Conducting business with uncompromising honesty and integrity.
- Continuing to lead in the home and coin-operated electronics entertainment fields and to become the leader in the personal/home computer field.
- Marketing programs that enable us to be responsive to consumer demands and to produce and package products that speak their language.
- Manufacturing quality products that provide outstanding value for the consumer.
- Customer satisfaction.
- Maintenance of a business environment that balances needed controls and concentrated feedback with freedom, initiative and creativity.
- Superior management personnel to attain superior results.

PAGE 2

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PAGE 3

maximizing
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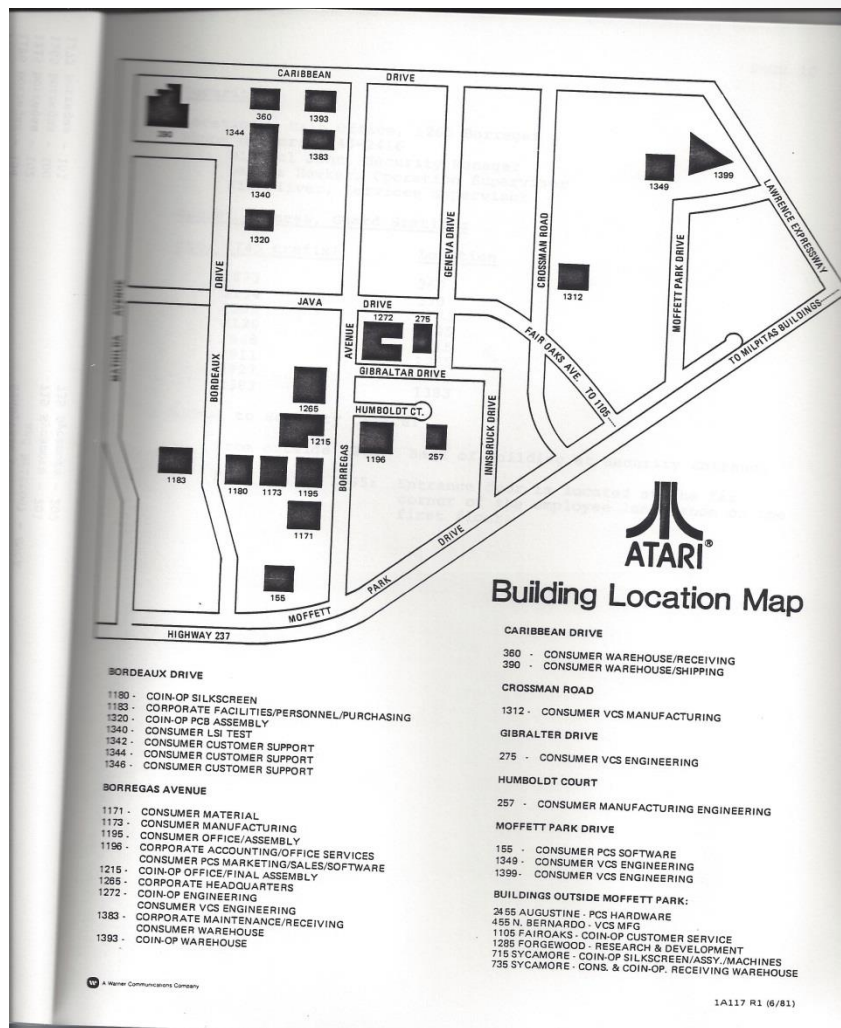
income,

growth

ing

100

Atari was huge in 1982



Technology at coin-op 1982

- 6502 assembly language was king
- Forth
- Vax timeshare system

Typical Team Composition

- One or two programmers per team
- One Hardware engineer making custom hardware
- Project leader

Typical Project Schedule

- Hardware and software developed simultaneously
- First major milestone: Basic Gameplay
- One milestone that matters: Fieldtest

Work Environment

- Work was divided between office and the lab
- Incredibly fun to walk around the labs and play the games
- No set work hours: results were all that mattered

Project Management

- Design Documents existed but were short and usually ignored
- Agile development 20 years before the word was invented
- Field tests and your peers were your real bosses

1982 Coin-op design rules

- Game time average 3 minutes
- Easy to learn: People should enjoy the game right away
- Hard to master: Keep up interest for several months

Getting Oriented

- VAX - timeshare system with terminals
- Fortran - general purpose language, no C available yet.
- 6502 - most existing Atari coin-op games used 6502

Credits for Crystal Castles

Franz Lanzinger, programmer

Samuel Lee, hardware

Barbara Singh, Susan McBride, Dave Ralston, art

Scott Fuller, project leader

John Ray, team leader

Paul Mancuso, Gardner Crosby, technicians

Larry Bryan, assisted with music entry

Rusty Dawe, RPM music system

John Ray and Scott Fuller



Larry Bryan and Paul Mancuso



Barbara Singh Franz Lanzinger



Susan McBride and Sam Lee



Rusty Dawe aka Bryson Dawe



Crystal Castles Constructors

1983

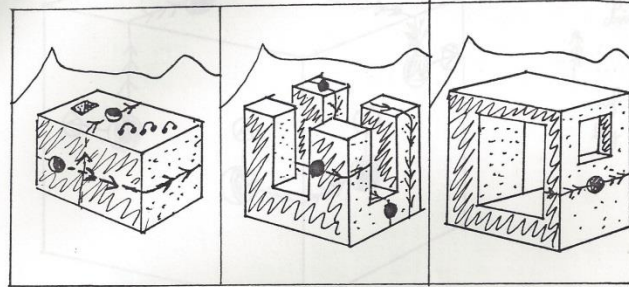


The Crystal Castles constructors (left to right): Barbara Singh, animator; John Rey, team manager; Gardner Crosby, technician; Sam Lee, engineer; and Scott Fuller, project leader. Not pictured are Franz Lanzinger, programmer, and Paul Mancuso, technician.

Cloners

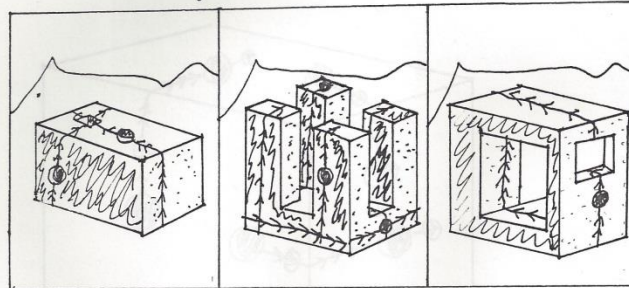
Picture 4 Periodic Paths

A. Trackball rotating right



→→→→ indicates path of a cloner

B. Trackball rotating forward



Toporoids history

- Found it in the big book of preapproved projects
- Original Toporoids had vector hardware, Asteroids controls, shooting!
- Resisting the urge to use Forth, went with 6502

Toporoids development

- Screen resolution 256 x 240
- Character looked like ET
- Programmer typed the art

Coding in 6502 assembly

- High level language macros made life easier
- Great debugging tools
- 16x more RAM than the 2600, 10x times more ROM

Lineprinter listing from 1983

```
ENDIF
ENDIF
ENDIF
RTS

-----
update player, jump etc.
JTL:
BYTE 00, 04, 08, 0B, 0E, 11, 14, 16, 18, 1A, 1C, 1D, 1E, 1F, 1F, 20

BYTE 20, 20, 1F, 1F, 1E, 1D, 1C, 1A, 18, 16, 14, 11, 0E, 0B, 0B, 04

N. PLU:
LDA EN.LMD      ; must be alive
IFNE
RTS
ENDIF

JSR EN.BRD      ; read both buttons

LDA ATTRACT
IFEQ
TRAI 0 EN.JBP      ; usually not jumping
LDA WV.TIM+1
IFNE
LDA WV.TIM
IFEQ

13 16:13:44 PAGE 1+

TRAI 1 EN.JBP
ENDIF
ENDIF
ENDIF

LDA EN.JFL      ; jump flag update
IFEQ
LDA EN.JDL
IFEQ
LDA EN.JBP
IFNE
LDA EN.TFL      ; button down
IFNE
LDA EN.TFL      ; if not in tunnel
IFEQ
TRAI OFF EN.JFL
TRAI 20 EN.JDL      ; start jump
TRAI 9 SN.NUM
JSR MN.SN1      ; jump sound
ENDIF
ENDIF
ELSE
```

Code from Crystal Castles

EN.JTL:

.BYTE 00,04,08,0B,0E,11,14,16,18,1A,1C,1D,1E,1F,1F,20

.BYTE 20,20,1F,1F,1E,1D,1C,1A,18,16,14,11,0E,0B,08,04

EN.PLU:

LDA EN.LMD ; must be alive

IFNE

RTS

ENDIF

Code excerpt continued

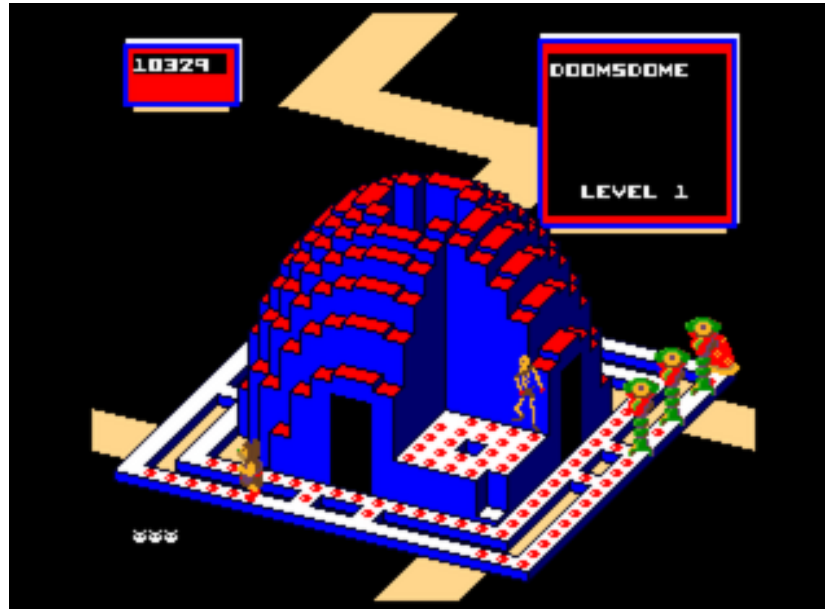
```
LDA EN.JFL  
IFNE  
    LDA EN.JDL  
    TAY  
    LDA EN.JTL(Y)  
    STA EN.HOF  
ELSE  
    TRAI 0 EN.HOF  
ENDIF  
  
RTS
```

Brainstorming

- New theme: fantasy
- Main character now a bear
- Witch, moving trees, and gem eaters
- Original name was Bear Braveheart

Tools for making levels

- Levels were made by coding in Fortran!
- Subroutines for stairs and blocks
- Tunnel bit



Music

MARCH
(From "Nutcracker Suite")
PETER I. TSCHAIKOWSKY

Tempo di n arcia vivo

p *mf* *f* *p* *8va ad lib.*

diminuendo *Presto* *pp sempre* *una corda* *ppp* *ritardato il tempo*

RPM

- Used in-house RPM tool by Rusty Dawe
- Similar to Midi
- Limited to 4 channels
- In Crystal Castles one channel dedicated to sound effects

Crystal Castles Unplugged

- Main Theme: Mephisto Waltz by Franz Liszt
- Extra Life: Mephisto Waltz by Franz Liszt
- Last Gem: March from Nutcracker by Peter Tschaikovsky
- Game Over: Rage over the Lost Penny by Ludwig van Beethoven
- High Score Table Entry: Scherzo from 3rd Symphony by Ludwig van Beethoven
- Game Ending Music: 1812 Overture by Peter Tschaikovsky

Ludwig Van Beethoven

- Scherzo from 3rd Symphony (1804)
- High Score Entry



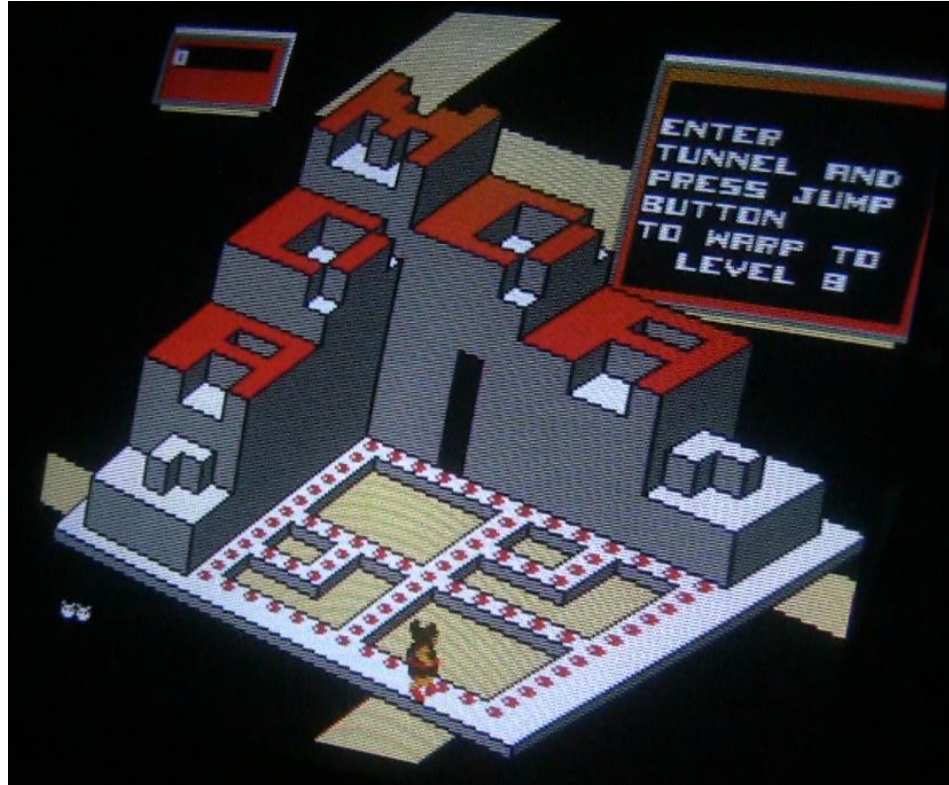
Ludwig Van Beethoven

- Scherzo from 3rd Symphony (1804)
- End of Level



Franz Liszt

- Mephisto Waltz (1862)
- Main Theme
- Beginning of game



Franz Liszt

- Mephisto Waltz (1862)
- Extra Life Music



Peter Ilyich Tschaikovsky

- Nutcracker Suite short excerpt (1892)
- Invincibility Music
- Plays when wearing the magic hat



Ludwig Van Beethoven

- Rage Over a Lost Penny, Vented in a Caprice (1798)
- End of level



Ludwig Van Beethoven

- Rage Over a Lost Penny, Vented in a Caprice (1798)
- Game Over



Peter Ilyich Tschaikovsky

- March from Nutcracker Suite (1892)
- You got the last gem



Peter Ilyich Tchaikovsky

- March from Nutcracker Suite (1892)
- They got the last gem



Peter Ilyich Tschaikovsky

- March from Nutcracker Suite (1892)
- You got the last gem



Peter Ilyich Tschaikowsky

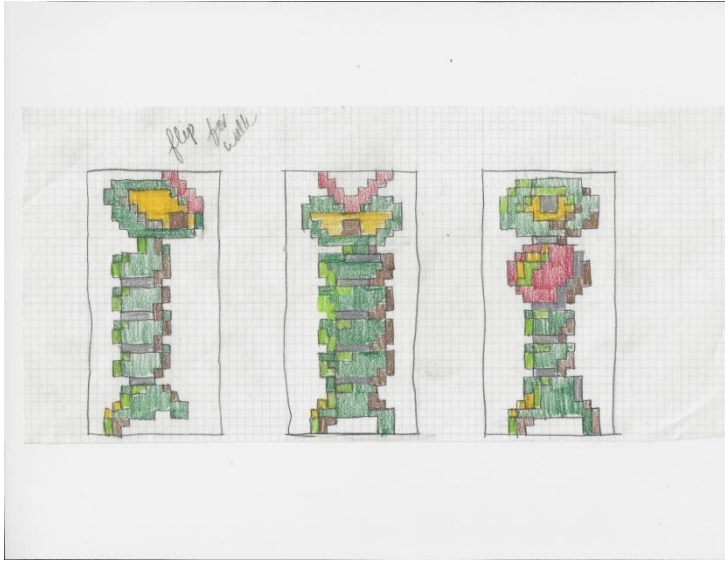
- 1812 Overture
Finale (1882)
- End Music
- Plays after player
completes level 10



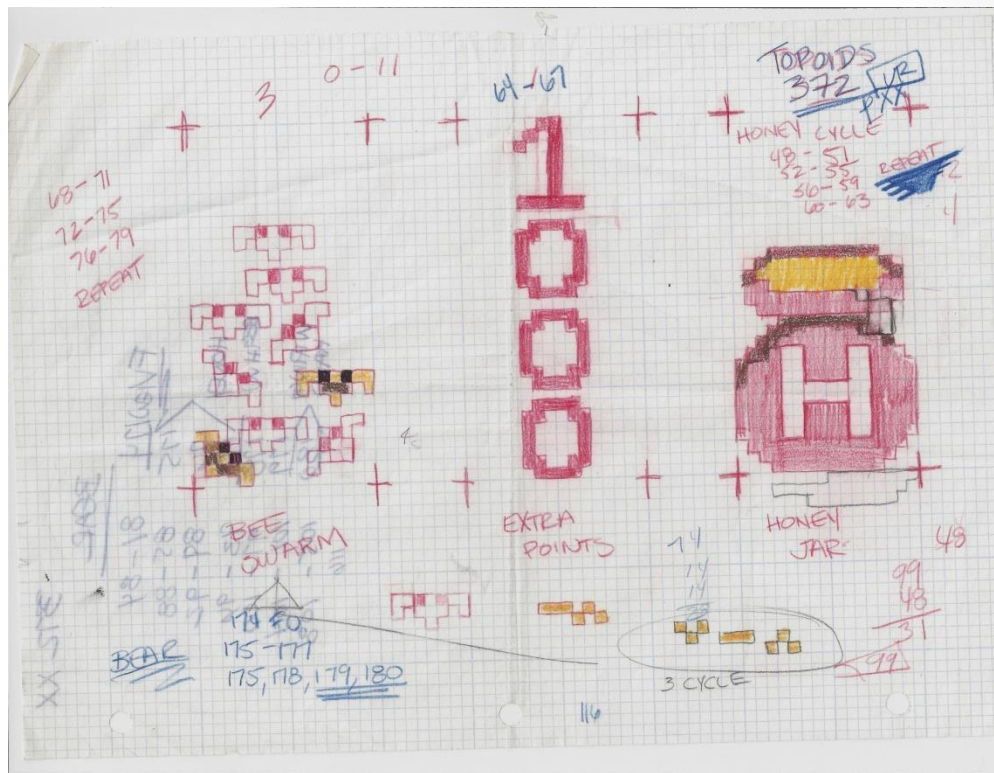
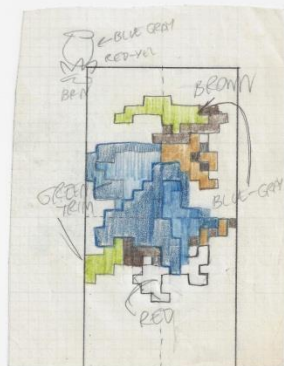
Character Art

- Characters drawn by Barbara Singh with help from Susan McBride
- In-house drawing system: PPS
- Characters first on paper, transferred to the PPS

Scans of paper character art



More character art



Internal Contest

HEAR YE HEAR YE

There will be a contest on CRYSTAL CASTLES on Thursday starting at 11:00 a.m. and ending at 4:00 p.m. The top ten contestants will receive cash prizes and free pizza. The rules are as follows:

1. How to enter:

Any coin-op employee may enter by signing up on the entry sheet posted on the machine.

2. Scoring:

Each contestant will play three games in succession. Only the highest score of the three games counts. Warping is not allowed on the first game.

3. Prizes:

rank	prize	rank	prize
1	\$20.00	6	\$ 5.00
2	\$15.00	7	\$ 4.00
3	\$10.00	8	\$ 3.00
4	\$ 8.00	9	\$ 2.00
5	\$ 6.00	10	\$ 1.00

There will be a pizza feed for the top ten and the project team. Time and place will be determined later. Also, the top ten get their initials on the default high score tab!

Contest results

Sign Up Leave			
1	Peter Thompson	13450 180900	(220750) PCT
2	Gary Steupler	27550 70250	(71000) CBS
3	Dan Ruz	132700 172000	(175400) REM
4	Rob Moore	46700, 129650	(167350) REM
5	Dave Ralston	57700 131650	(169650) PAR
6	Ross Cox	18750 (27050) 18400	
7	Don Traeger	26550 17500	(51150)
8	Mike Palmer	(36100) 24750	(10) NFP
9	Mark Cerny	125250 232900	(237900)
10	D. Pettibrew		
11	L. Bryan	26350 108100	(148550) LEB
12	S. Fuller	24700	
13	Steve Calfee	15300	
14	PETE FRANUSIC	(42400) 78450	(3) PVF
15	Chris Downard	17000	
16	R	12200 (24,450) 16,650	
17			

New Initials

PT
ORR

Field Tests

- First Field test was at Galactican arcade in San Jose, early 1983

First Field Test Results

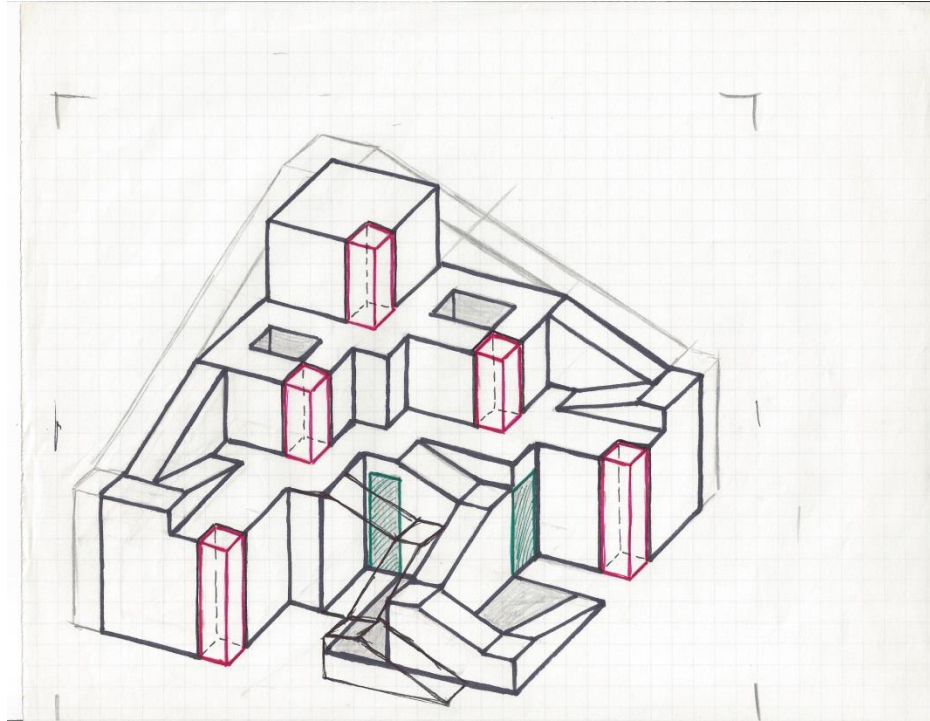
Crystal Castles ; Galactica I; 3rd week end 3/4/83

#1	Pole Position	402 ²⁵	
#2	Front Line	335 ⁵⁰	
#3	Star Trek	300 ⁷⁵	(2 nd week)
#4	Joust	281 ²⁵	(w/ New program to shorten game times)
#5	Millipede	278 ⁵⁰	
* #5	<u>Crystal Castles</u>	278 ⁵⁰	5.2% { 1 st week 302, 6%, #3
#7	Centipede	175-	2 nd week 302 6.1%, #4

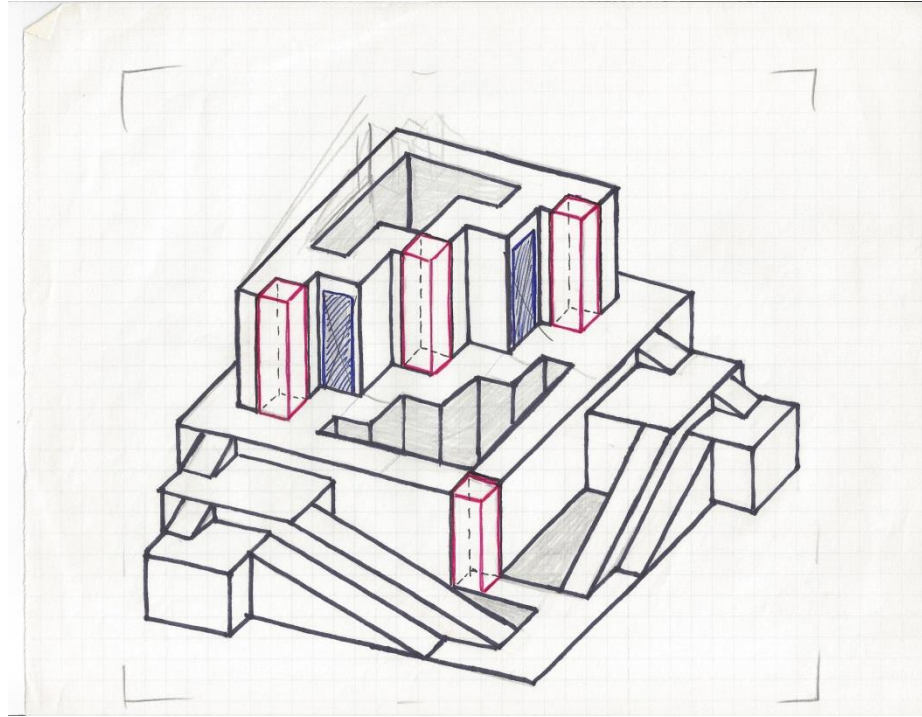
Field test conclusions

- Earnings OK, but not quite good enough
- Needed better and more interesting levels
- Minor fine tuning

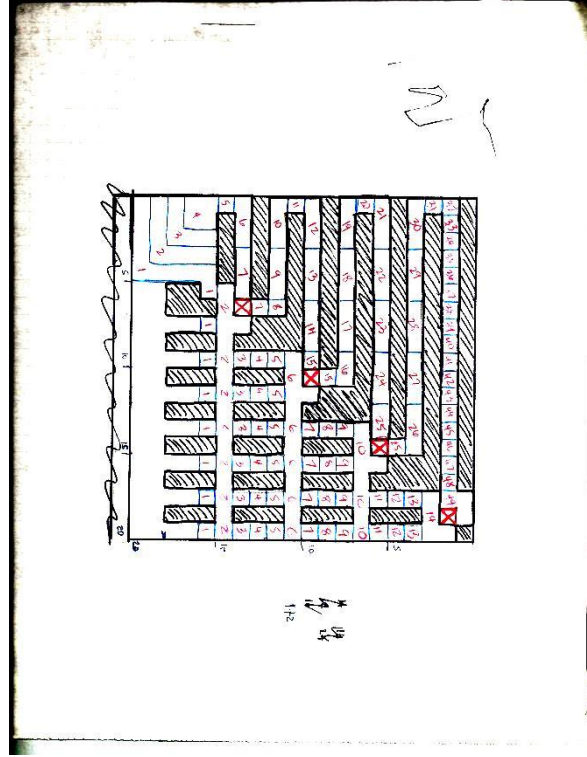
New levels by Dave Ralston



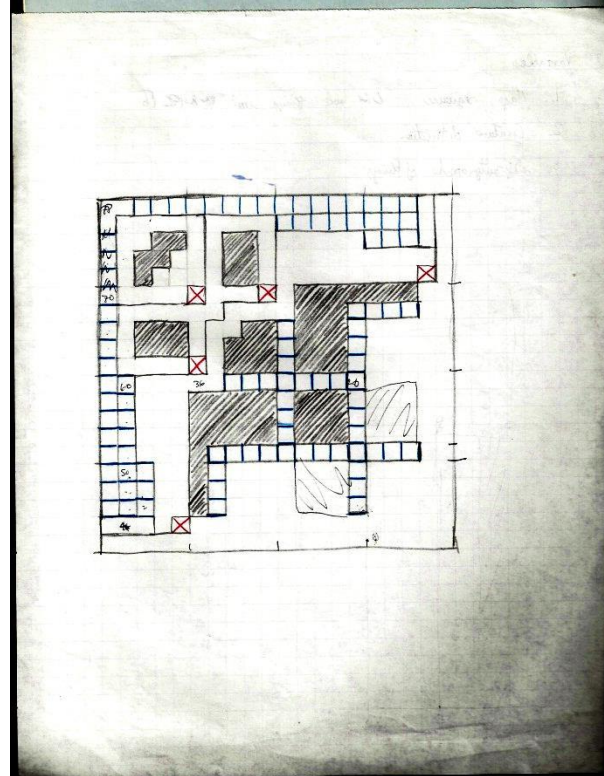
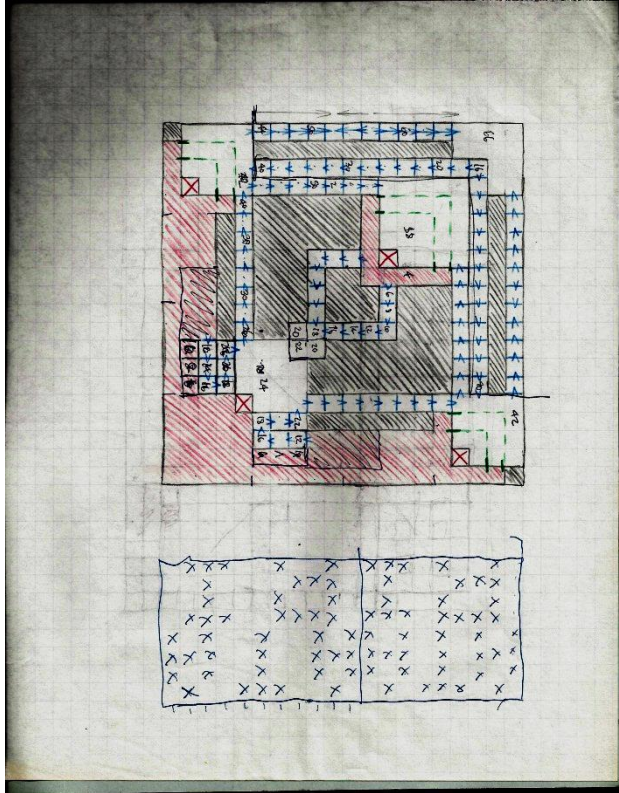
Drawn on Paper First



Convert from iso to top-down



More top-down designs



second
field test
much
better

LOCATION: CENTRAL PARK ARCADE, MOUNTAIN VIEW
DATE INSTALLED: 04/08/83 RETURN DATE: 05/13/83
HIGHEST EARNINGS: \$344.50
LOWEST EARNINGS: \$132.00 AVERAGE EARNINGS: \$261.97
COINAGE: 1 COIN/PLAY; 3 LIVES BONUS LEVEL: 1 AT 50K POINTS
NUMBER OF PLAYERS: 1 OR 2 ALTERNATING

LOCATION PROFILE: This is a large arcade with many frequent/expert players. There are now 61 games here, two of which are pinball. The arcade clientele can purchase food and beverages at a snack bar located within the Central Park.

CURRENT WEEK ENDING 05/29/83: CRYSTAL CASTLES was the number four game this week, earning 4.5% total gross. The program was modified slightly on 5/27 and the game was down for several hours.

HISTORY: CRYSTAL CASTLES was installed on 4/8. A XEVIUS with new program chips was installed on "C" on 4/8. Sinistar arrived on 4/14 and Congo Bongo on 4/25. Cheyx Hockey was added on 5/20. Fax and Mr. Do were added on 5/26.

WEEK:	05/29/83	%	05/22/83	%	05/15/83	%	05/08/83	%	05/01/83	%	04/24/83	%
CRYSTAL CASTLES	225.25	4.5	251.50	5.9	252.50	5.4	269.25	4.7	276.50	4.3	344.25	4.3
POLE POSITION (UR)	264.00	5.3	242.00	5.7	272.50	5.8	295.25	5.1	312.00	4.8	424.00	5.3
XEVIUS	170.50	3.4	173.00	4.0	204.75	4.4	216.00	3.8	269.75	4.1	288.25	3.6
HILLIFEDE	175.25	3.5	197.75	4.6	190.00	4.0	243.00	4.2	240.75	3.7	264.75	3.3
SINISTAR UR	225.75	4.5	235.00	5.5	223.00	4.7	283.25	4.9	294.00	4.5	349.50	4.4
BAG MAN	129.00	2.6	131.50	3.1	139.50	3.0	175.25	3.1	221.50	3.4	230.50	2.9
JOUST	121.50	2.4	118.75	2.8	134.00	2.8	154.25	2.7	170.25	2.6	225.25	2.8
BUMP 'N JUMP	88.50	1.8	85.00	2.0	103.25	2.2	82.75 e	1.4	124.25	1.9	181.50	2.3
CONGO BONGO	87.50	1.7	194.00	4.5	234.75	5.0	309.50	5.4	404.50	6.2	-	-
CHEXX HOCKEY	272.00	5.4	119.75 b	2.8	-	-	-	-	-	-	-	-
FAX	166.00 a	3.3	-	-	-	-	-	-	-	-	-	-
BURGER TIME	91.00	1.8	83.00	1.9	113.75	2.4	97.50 f	1.7	120.00	1.8	158.75	2.0
TIME PILOT	146.50	2.9	159.25	3.7	166.00	3.5	174.75	3.0	185.75	2.9	261.50	3.3
LOCATION GROSS:	5010.50		4272.25		4702.50		5736.00		6504.50		7962.50	

a-4 days
b-2½ days
e-down 2 days
f-removed from location

DT/jh

Subject: Prototype Collections - CRYSTAL CASTLES

LOCATION: FESTIVAL GAME PALACE, FRESNO

DATE INSTALLED: 04/15/83 RETURN DATE: 05/25/83

HIGHEST EARNINGS: \$272.00

LOWEST EARNINGS: \$122.75 AVERAGE EARNINGS: \$207.50

COINAGE: 1 COIN/PLAY; 3 LIVES BONUS LEVEL: 1 AT 50K POINTS

NUMBER OF PLAYERS: 1 OR 2 ALTERNATING

LOCATION PROFILE: This test site is located on the outskirts of Fresno, near a Malibu Grand Prix, a Pizza Time Theatre, and one additional arcade. The clientele is a mixture of average and highly skilled players. There are currently 94 games here, including 14 cocktail and five pinballs. Tokens here are priced at five for \$1.00 and 30 for \$5.00.

CURRENT WEEK ENDING 05/26/83: During its sixth week of testing, CRYSTAL CASTLES ranked as the number five game behind new additions; Cosmic Chasm, Bubbles, POLE POSITION UR and POLE POSITION SD. Its percent of total gross declined to 2.5%.

HISTORY: CRYSTAL CASTLES was installed on 4/15. Star Trek SD and Wacko were added on 4/8. Mazer Blazer arrived on 4/12 and was removed on 5/4 due to poor earnings and technical problems. XEVIQUS arrived on 5/13. Cosmic Chasm and Bubbles were added on 5/20.

WEEK:	05/26/83	%	05/19/83	%	05/12/83	%	05/05/83	%	04/28/83	%	04/21/83	%
CRYSTAL CASTLES	122.75	2.5	200.75	3.5	186.00	3.0	192.75	2.7	272.00	3.5	270.75	3.3
POLE POSITION SD	126.50	2.6	154.25	2.7	188.75	3.0	210.00	3.0	252.00	3.2	245.50	3.0
POLE POSITION UR	132.00	2.7	150.00	2.6	126.00	2.0	112.25	1.6	154.50	2.0	146.25	1.8
STAR TREK SD	108.50	2.2	179.25	3.2	180.25	2.9	180.25	2.6	197.75	2.5	245.25	3.0
STAR TREK UR	-	-	-	-	127.75	2.0	120.25	1.7	127.50	1.6	139.75	1.7
COSMIC CHASM	241.25	5.0	-	-	-	-	-	-	-	-	-	-
CHEXX HOCKEY	121.50	2.5	162.50	2.9	144.50	2.3	193.00	2.7	131.50	1.7	161.50	2.0
O-BERT	90.00	1.8	92.00	1.6	127.25	2.0	117.25	1.7	107.50	1.4	154.25	1.9
HILLIPEDE	108.50	2.2	111.75	2.0	127.25	2.0	116.25	1.7	121.75	1.5	93.25	1.1
WACKO	98.50	2.0	130.75	2.3	161.25	2.6	166.50	2.4	214.00	2.7	190.50	2.3
BAG MAN	82.60	1.7	131.50	2.3	140.00	2.2	143.00	2.0	130.75	1.7	158.00	1.9
FRONT LINE	93.00	1.9	116.25	2.1	110.25	1.8	110.50	1.6	160.00	2.0	139.75	1.7
TIME PILOT	95.50	2.0	105.50	1.9	153.00	2.4	148.00	2.1	135.75	1.7	150.75	1.9
XEVIQUS	120.75	2.5	214.50	3.8	-	-	-	-	-	-	-	-
BUBBLES	154.50	3.2	-	-	-	-	-	-	-	-	-	-

Going to Fresno

They're building 5000!

- Work isn't done yet
- Localized Versions
- Sit down Version
- Total about 7000



Ending, flashing trackball, nasty trees, warp system

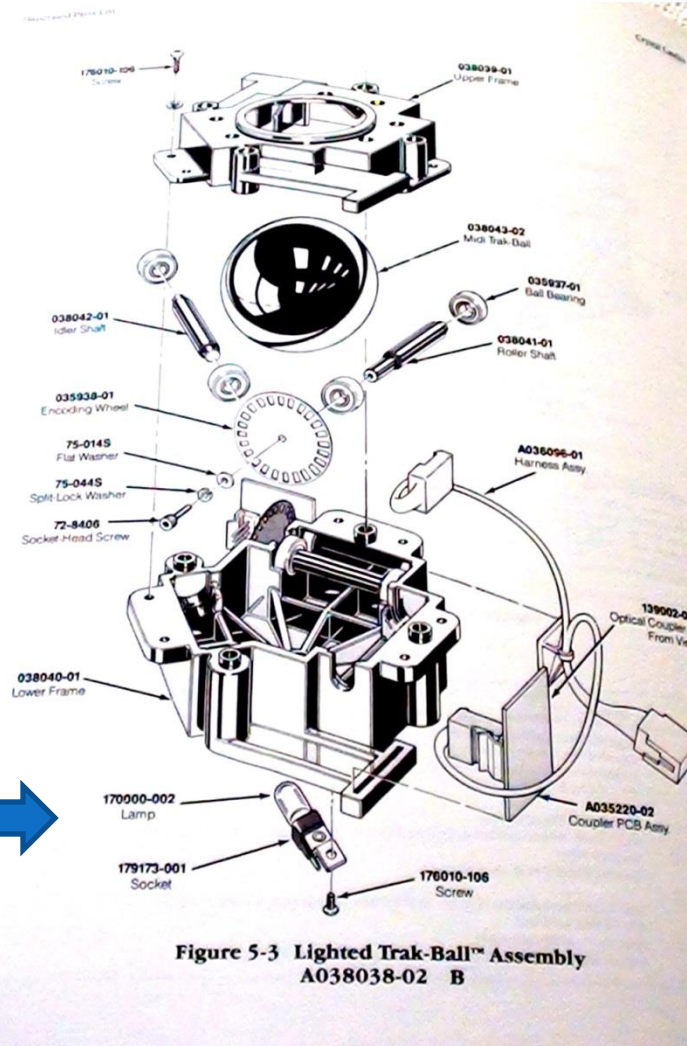
INNOVATIONS IN CRYSTAL CASTLES

Hardware Innovations

- Flashing Trackball -- ball is transparent, light underneath
- First arcade game with sprites + bitmap, designed by Sam Lee
- Custom chips by Scott Fuller, including the Leta chip
- Complex priority scheme between sprites and bitmap

Flashing Trackball

Light Bulb



Game Design Innovations

- First arcade character game with an ending
- “Secret” and Tunnel Warp system
- Initials of high score leader on first maze
- Initials of arcade legends baked into later mazes
- Bentley Bear’s red pixels behind wall

Game Design Innovations II

- Random changes to playfields on some levels
- Assuring that nobody can “turn over” the score
- Color schemes based on number of plays
- Bonus points at end

Secrets



"Psssst!
I'm back with
a couple more
secrets for
you!"

Whew! I've got just a moment to catch my breath. So here's the scoop on those far-out creatures you meet in **CRYSTAL CASTLES™**, my favorite COIN video from ATARI!

NASTY TREES They're always in hot pursuit of guess who—me! Although I can jump over these aggressive opponents—causing them to freeze and shrink for a second or two—your best strategy is to keep obstacles between them and yours truly!

CRYSTAL BALLS While the trees go directly toward where I am, the crystal balls seem to go toward where I've just been. They suffer from a certain bit of inertia—or delay—which works against them but for me! Your strategy here is to move in one direction and then change course suddenly.

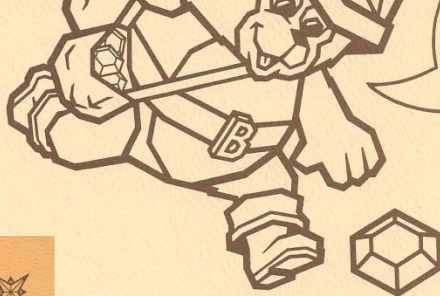
GEM EATERS These are relatively stupid creatures. Their only interest is in digesting gems, and they'll rush around madly looking for "vittles" if there aren't any gems nearby. Although I can catch them when they're eating, it's best to avoid them in the higher levels when it takes these critters less than a second to digest a gem!

SWARM OF BEES This buzzing bunch appears to purposely get me moving along when I take my ol' sweet time in picking up gems. If you can get the honey pot right away, this delays the bees from coming out. In higher levels, they get more aggressive—no longer dropping down to the honey pot spot but dropping down right on me!

Don't miss the next **Bentley Bulletin** for some hot tips on the Ghost, Skeleton, Bertholda the Witch, and her Caldron. I might even let you in on a Super Secret or two!

Now, I've got to make tracks back to the play in progress. See you soon . . .

Bentley Bear



Have I got a
secret or two
for you!

I'm Bentley Bear™ of **CRYSTAL CASTLES™**, the latest COIN video game from ATARI®. You'll probably find it easy to pick up the game play at the beginning. But don't be fooled! The depth of play you'll experience in the higher levels will provide you with plenty of challenge! So here are a few tricks to help you out:

WARP TUNNEL Watch for the door to appear on the screen when beginning a new game. Maneuver me through it, and press JUMP. This is our passageway to the same level of play you just completed in the preceding game, provided you were able to make it all the way through the first maze of that level. If not, we'll jump up to the next lower level.

SECRET WARPS In level 1, get me to the back left-hand corner of the maze and press JUMP. That'll take me to level 3 where you can do the same thing—only this time I must be wearing the magic hat and positioned in the rear corner of the hidden ramp to jump to level 5. Now you must wait until the 3rd maze ("Crossroads" of level 5 before another secret warp can blast me off to level 7. Just get me to the back left-hand corner of the top wall; then hit the JUMP button.

HIGH SCORER'S INITIALS Surprise! The initials of the top high scorer in the Crystal Castles Hall of Fame actually form the maze of the first screen in level 1—both vertically and horizontally! Now I've heard about seeing your name in lights—but seeing your name in blocks?! WOW!

Well, I hear the players calling . . . got to dash. But take it from me—with these tips, you'll be no babe in the woods!

Watch for the next **Bentley Bulletin** . . . coming soon!

Bentley Bear

Crystal Castles Expert Video

- Mark Alpiger
- Wrote the book on playing Crystal Castles
- Website: classicarcadegaming (dot com)
- Taught world record holder Frank Seay, **910,722**

Mark Alpiger plays to the End



30 years later

POSTMORTEM

What Went Wrong

- Needed more story telling, character development
- Trackball was fun, but it limited sales and made it tough to port to consoles, PC
- Should have preserved more code and art for posterity!

What Went Right

- Trackball game mechanic
- Non-violent yet high-energy and exciting
- Graphics look good (for 1983)
- Warp system worked very well, responsible for high earnings
- Ending
- Tuned just right for beginners and advanced players

A lot can happen in 30 years

WHAT HAPPENED AFTER RELEASE

Why did I leave Atari?

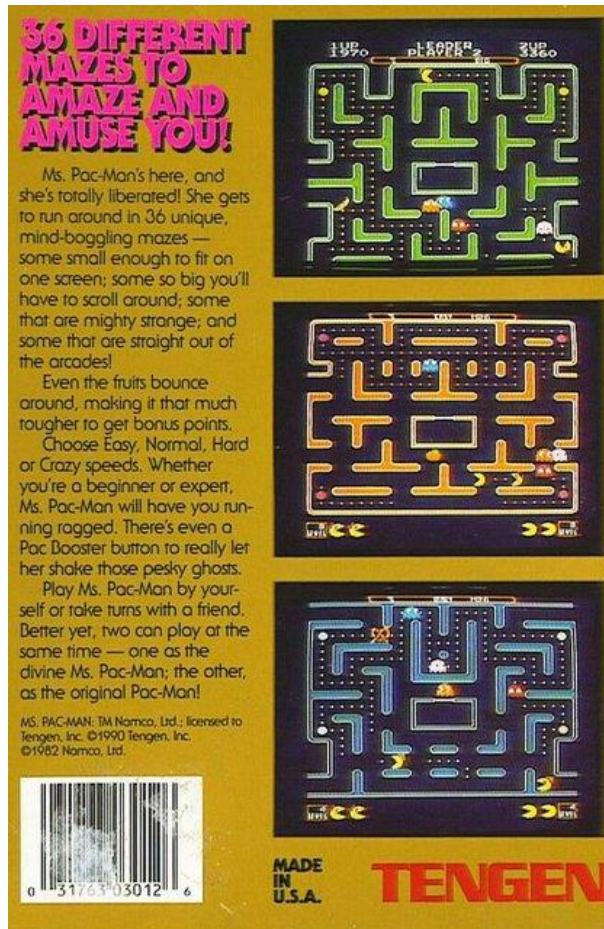
- Royalties vs. bonuses
- 2600 Crystal Castles
- History of disagreements with management

A Love-Hate Relationship

- Joystick vs. Trackball story
- Credits
- Ending
- **Best job EVER**

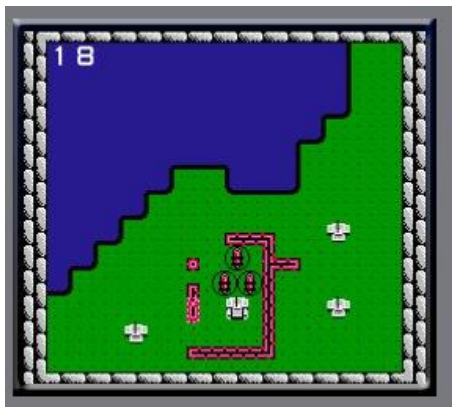
Tengen

- 6502 again?
- Toobin'
- Ms. Pacman



Bitmasters

- Krazy Kreatures
- Rampart
- Championship Pool
- NCAA Final Four Basketball



Mode 7 Rampart on SNES

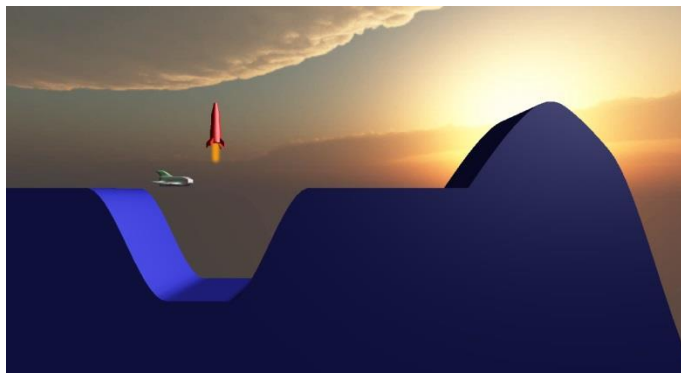
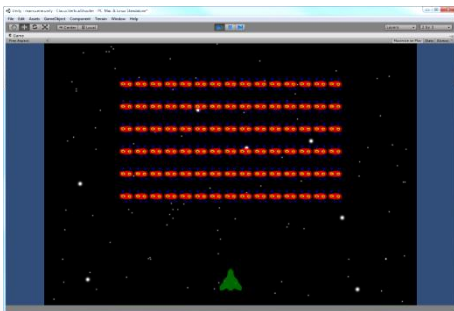
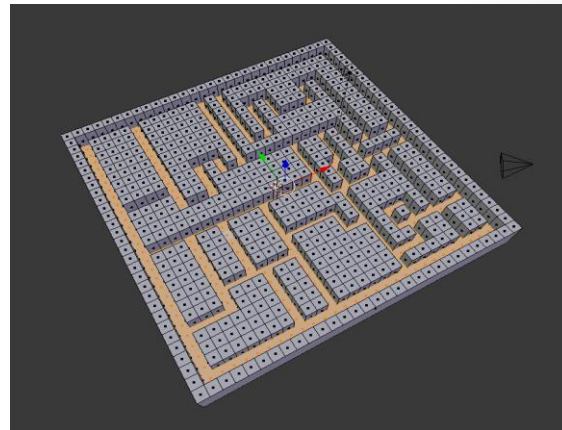


Actual Entertainment



Classic Game Design Book

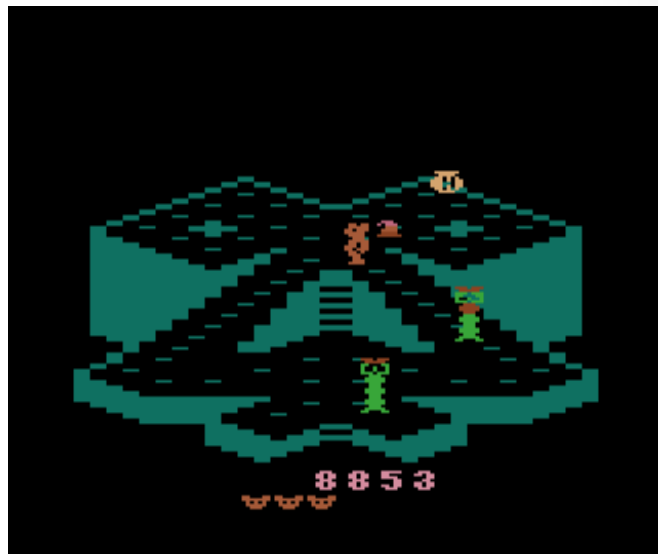
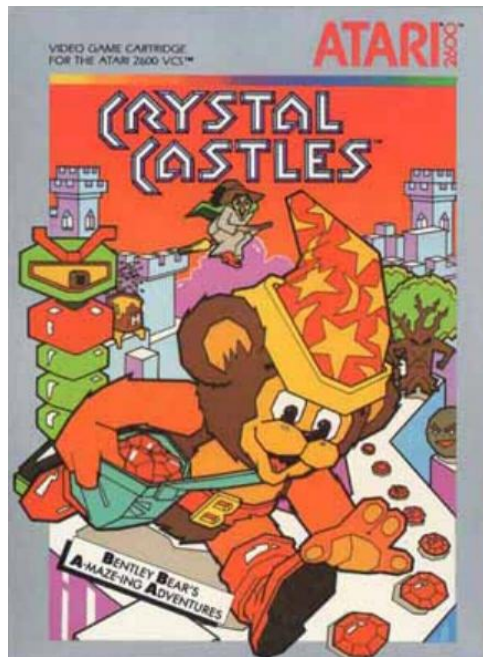
- From Pong to Pac-Man with Unity
- Publisher Mercury Learning (GDC Booth #235)
- Printed book at all major retailers summer 2013
- Available in digital format for any device
- Uses Unity, Blender, GIMP2 and Audacity
- Step-by-Step Unity projects



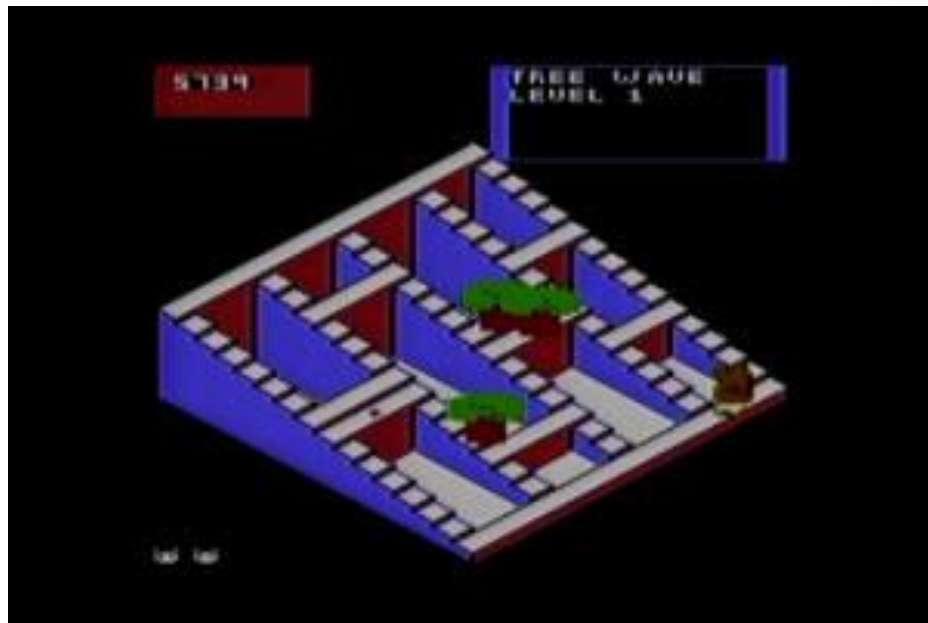
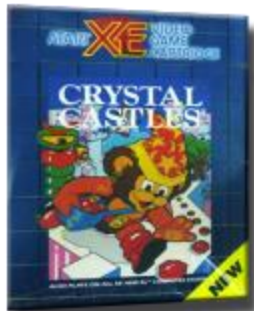
Some games keep going, and going, and going...

CRYSTAL CASTLES AFTER 1983

2600 Crystal Castles



5200 Crystal Castles



Conversions, Conversions

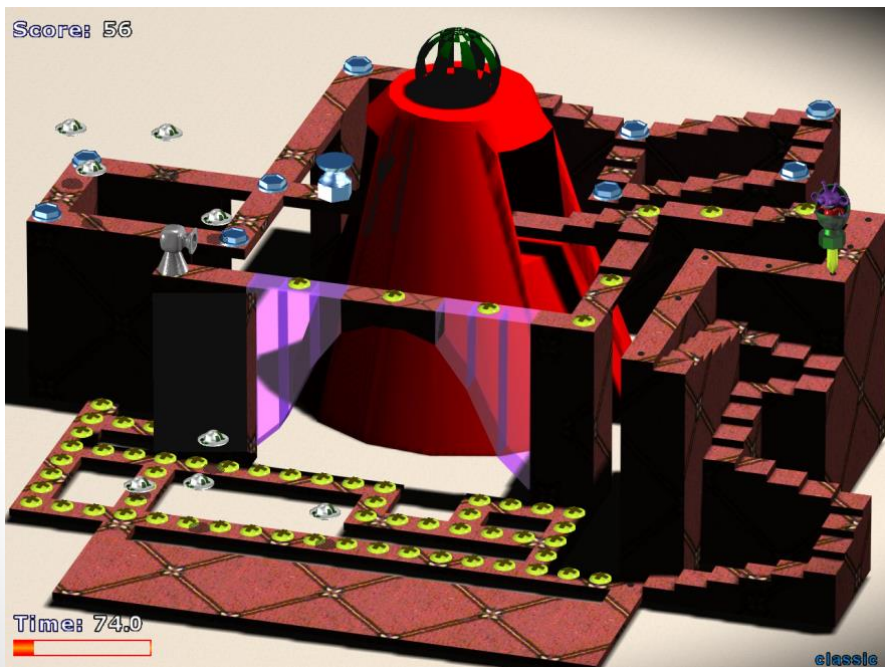
Apple II, Atari 2600, Atari 8-bit, Atari ST,
Commodore 64, BBC/Acorn Electron, ZX
Spectrum, Amstrad CPC, PC, Playstation,
Dreamcast, Windows, Xbox, Playstation 2,
Xbox 360, IOS,...

Gubble

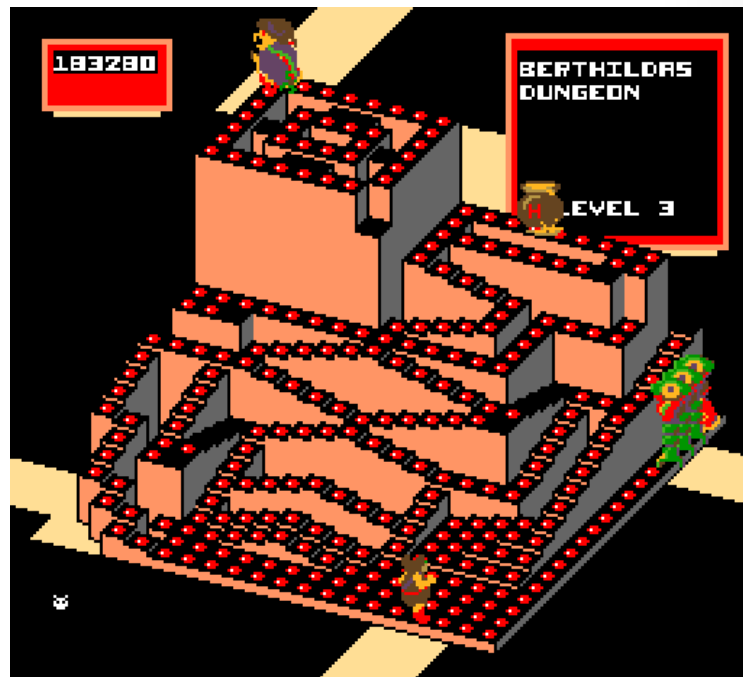
- Often compared to Crystal Castles
- First released in 1996 for PC
- Gubble HD: available at gubble.com
- Gubble for IOS: available at Apple App store
- Gubble 3 announced in 2012

Gubble vs. Crystal Castles

Gubble



Crystal Castles



Advice for Game Developers:

- Invent
- Keep your long-term IP
- Fix bugs before adding new features
- Archive everything, take photos
- Have fun and live!

Q&A



@lanzinger

www.gubble.com