MODERNIZING A MONOLITH

SCALING DOWN A MOUNTAIN

ABOUT THIS TALK

ABOUT THIS TALK

CONVERTING A LARGE SOLUTION TO A WEB APP

ABOUT THIS TALK

CONVERTING A LARGE SOLUTION TO A WEB APP

CAN WE EVEN DO THIS?

ABOUT THIS TALK

CONVERTING A LARGE SOLUTION TO A WEB APP

CAN WE EVEN DO THIS?

BREAKING COMPONENTS DOWN

ABOUT THIS TALK

CONVERTING A LARGE SOLUTION TO A WEB APP

CAN WE EVEN DO THIS?

BREAKING COMPONENTS DOWN

PRIORITIZING FUNCTIONALITY

ABOUT THIS TALK

CONVERTING A LARGE SOLUTION TO A WEB APP

CAN WE EVEN DO THIS?

BREAKING COMPONENTS DOWN

PRIORITIZING FUNCTIONALITY

STREAMLINING DEVELOPMENT

ABOUT THIS TALK

CONVERTING A LARGE SOLUTION TO A WEB APP

CAN WE EVEN DO THIS?

BREAKING COMPONENTS DOWN

PRIORITIZING FUNCTIONALITY

STREAMLINING DEVELOPMENT

CREATING BUILDING BLOCKS

ABOUT ME

JUAN NARVAEZ

LEAD SOFTWARE ENGINEER

STARTED AT CERNER OUT OF GRADUATE SCHOOL

WORKED ON DIAGNOSTIC AND REFERENTIAL IMAGING SOLUTIONS FOR 6 YEARS

MOVED TO APPLE TO WORK ON THE TRANSIT PROJECT

4 YEARS LATER CAME BACK TO CERNER TO WORK ON MEDICAL IMAGING

ABOUT THE APP

ABOUT THE APP

FDA 510K REGULATED MEDICAL IMAGING SOLUTION

ABOUT THE APP

FDA 510K REGULATED MEDICAL IMAGING SOLUTION

22 PART 3500+ PAGE DICOM STANDARD

ABOUT THE APP

FDA 510K REGULATED MEDICAL IMAGING SOLUTION

22 PART 3500+ PAGE DICOM STANDARD

6 MILLION LINES OF CODE

ABOUT THE APP

FDA 510K REGULATED MEDICAL IMAGING SOLUTION

22 PART 3500+ PAGE DICOM STANDARD

6 MILLION LINES OF CODE

NATIVE CODE | JAVA CODE

ABOUT THE APP

FDA 510K REGULATED MEDICAL IMAGING SOLUTION

22 PART 3500+ PAGE DICOM STANDARD

6 MILLION LINES OF CODE

NATIVE CODE | JAVA CODE

RUN ON HIGH PERFORMANCE WORKSTATIONS

SO

WHERE

DO WE START?

WHAT ARE OUR

CONCERNS

WITH THE PROJECT AND ITS SCOPE?

FEATURE REQUIREMENTS

FEATURE REQUIREMENTS

RESOURCING

FEATURE REQUIREMENTS

RESOURCING

TECHNOLOGY

FEATURE REQUIREMENTS

RESOURCING

TECHNOLOGY

TESTING

FEATURE REQUIREMENTS

RESOURCING

TECHNOLOGY

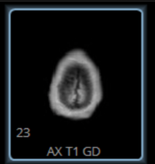
TESTING

SCALE OF DATA

File Edit View Bookmark Workspace Help

Thumbnails - Reference Lines, Study B

MRI BRAIN W/ + W/O CONTRAST - [4/28/10]



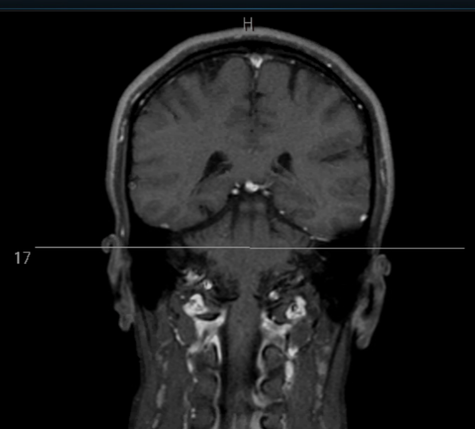
Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056

Img Nbr: 12
Slice Loc: 38.5
MRI BRAIN W/ + W/O CONTRAST
Acq: 4/28/10 10:44 AM
Ser Nbr: 801

7 cm
3.0 mm thk,3.5 mm sp
FOV: 21[illegible].0 mm
TR: 45[illegible].4 ms
TE: 100.0 ms
Zoom: 90%
W/L 322.5/185.5

Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056

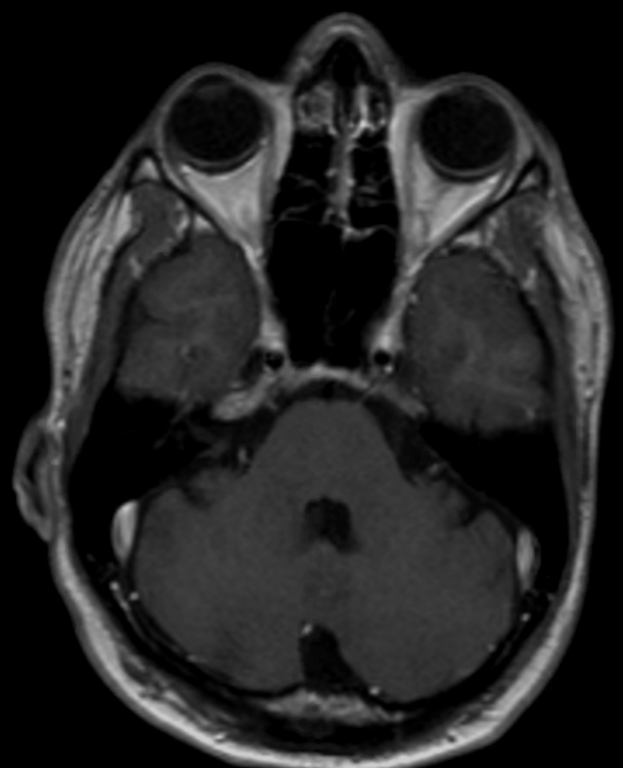
Img Nbr: 15
Slice Loc: 105.0
MRI BRAIN W/ + W/O CONTRAST
Acq: 4/28/10 10:52 AM
Ser Nbr: 1001



7 cm
5.0 mm thk,7.5 mm sp
FOV: 230.0 mm
TR: 518.5 ms
TE: 15.0 ms
Zoom: 168%
W/L 359.1/206.6

Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056

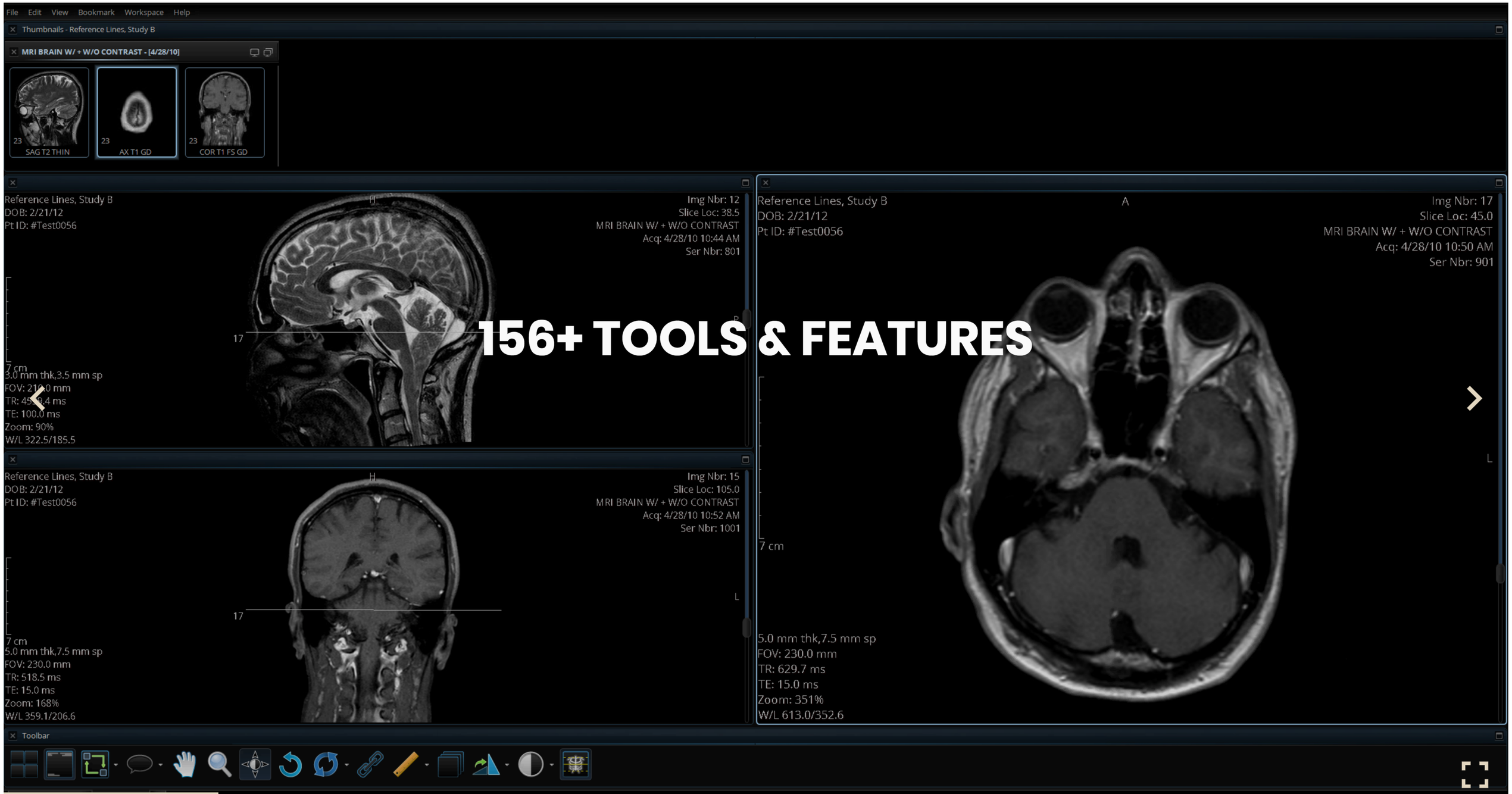
Img Nbr: 17
Slice Loc: 45.0
MRI BRAIN W/ + W/O CONTRAST
Acq: 4/28/10 10:50 AM
Ser Nbr: 901



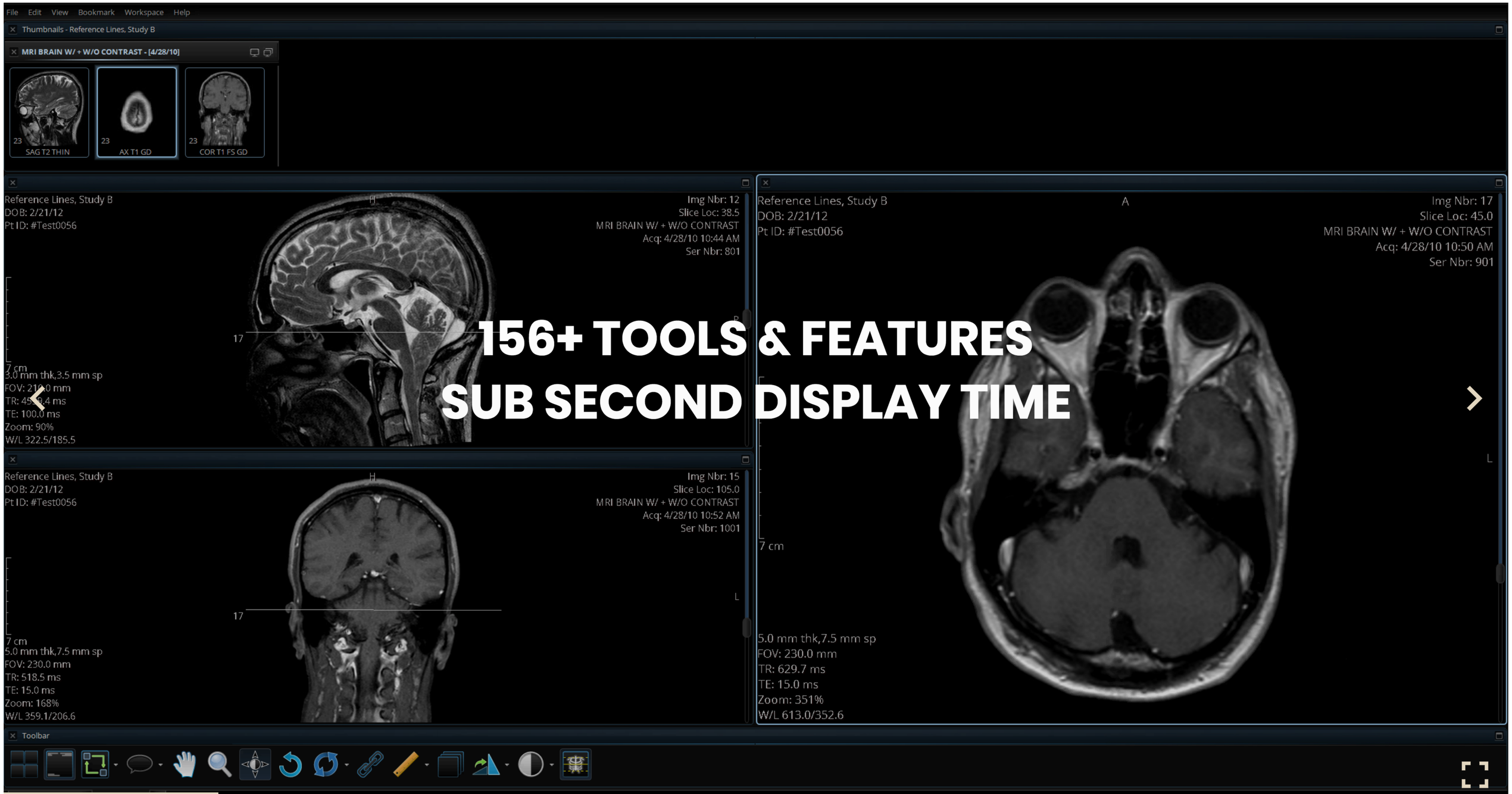
7 cm
5.0 mm thk,7.5 mm sp
FOV: 230.0 mm
TR: 629.7 ms
TE: 15.0 ms
Zoom: 351%
W/L 613.0/352.6

Toolbar

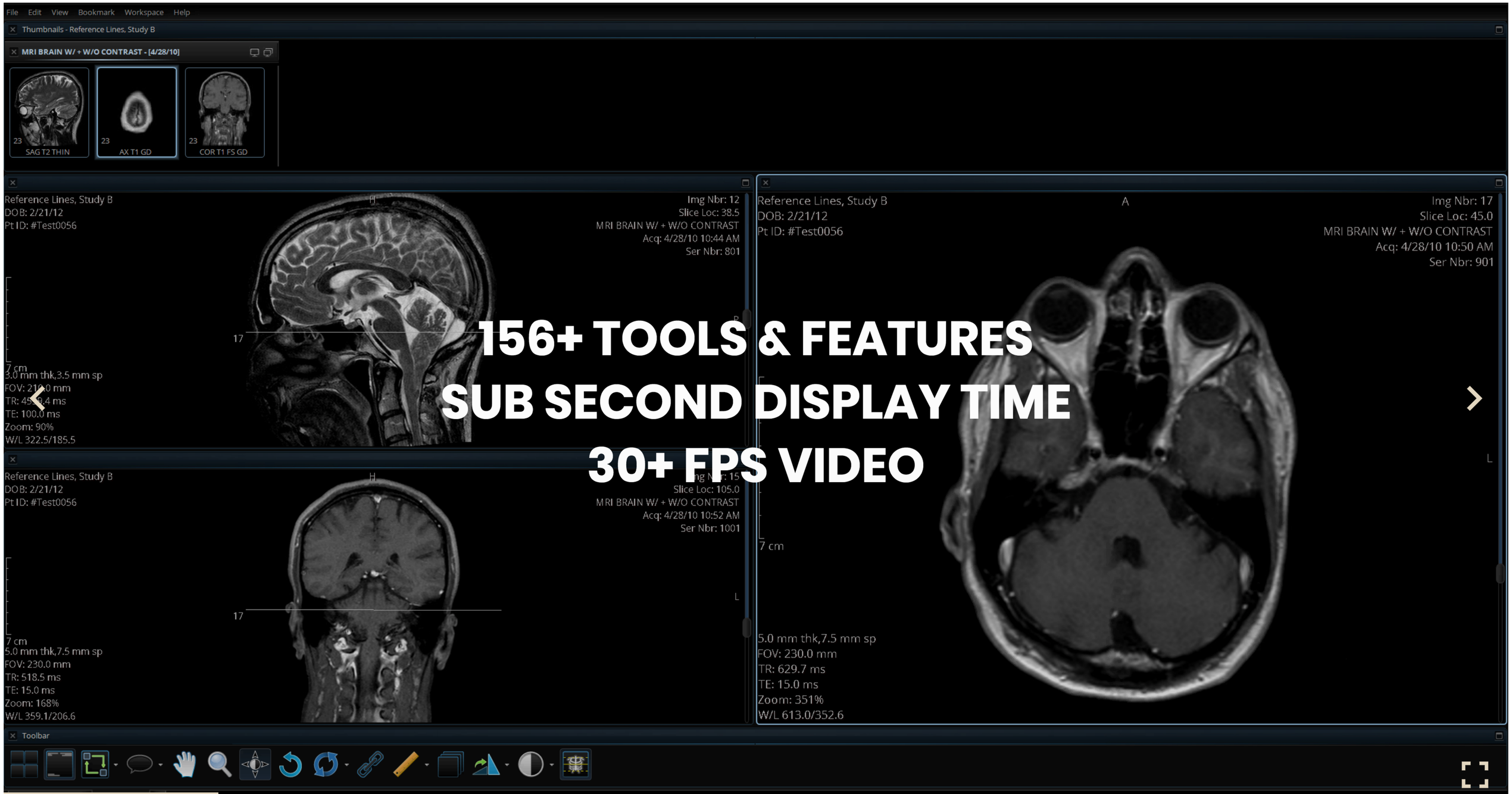
jupituser | surround in devcerner.net



156+ TOOLS & FEATURES



156+ TOOLS & FEATURES
SUB SECOND DISPLAY TIME



156+ TOOLS & FEATURES
SUB SECOND DISPLAY TIME
30+ FPS VIDEO

SOUNDS LIKE A LOT OF

WORK

RIGHT?

START WITH LESS CONFIGURATION

START WITH LESS CONFIGURATION

BASIC FUNCTIONALITY

START WITH LESS CONFIGURATION

BASIC FUNCTIONALITY

PRUNE THE LIST OF FEATURES

START WITH LESS CONFIGURATION

BASIC FUNCTIONALITY

PRUNE THE LIST OF FEATURES

MAKE EVERYTHING REUSABLE

START WITH LESS CONFIGURATION

BASIC FUNCTIONALITY

PRUNE THE LIST OF FEATURES

MAKE EVERYTHING REUSABLE

EVEN REQUIREMENTS

USE THIS AS AN

OPPORTUNITY

TO STREAMLINE AND PRIORITIZE THE SOLUTION

WE'RE PROBABLY GOING TO NEED A

LARGE

TEAM OF TALENTED INDIVIDUALS

TOO BAD

WE HAVE A TEAM OF 2

TOO BAD

WE HAVE A TEAM OF 2
AND WE MIGHT BE PHONING IN THE TALENT

START

SIMPLE

WITH THE SMALLEST PIECE OF BASIC FUNCTIONALITY

START

SIMPLE

WITH THE SMALLEST PIECE OF BASIC FUNCTIONALITY

NOT MVP

Cerner SkyVue®

File Edit View Bookmark Workspace Help

Thumbnails - Reference Lines, Study B

MRI BRAIN W/ + W/O CONTRAST - [4/28/10]

23 SAG T2 THIN

23 AX T1 GD

23 COR T1 FS GD

Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056

H

Img Nbr: 12
Slice Loc: 38.5
MRI BRAIN W/ + W/O CONTRAST
Acq: 4/28/10 10:44 AM
Ser Nbr: 801

P

17

7 cm
3.0 mm thk,3.5 mm sp
FOV: 210.0 mm
TR: 4539.4 ms
TE: 100.0 ms
Zoom: 90%
W/L 322.5/185.5

Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056

H

Img Nbr: 15
Slice Loc: 105.0
MRI BRAIN W/ + W/O CONTRAST
Acq: 4/28/10 10:52 AM
Ser Nbr: 1001

L

17

7 cm
5.0 mm thk,7.5 mm sp
FOV: 230.0 mm
TR: 518.5 ms
TE: 15.0 ms
Zoom: 168%
W/L 359.1/206.6

Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056

A

Img Nbr: 17
Slice Loc: 45.0
MRI BRAIN W/ + W/O CONTRAST
Acq: 4/28/10 10:50 AM
Ser Nbr: 901

L

7 cm

5.0 mm thk,7.5 mm sp
FOV: 230.0 mm
TR: 629.7 ms
TE: 15.0 ms
Zoom: 351%
W/L 613.0/352.6

Toolbar

Imaging Desktop | Imaging

junituser | surround.ip.devcerner.net

Reference Lines, Study B
DOB: 2/21/12
Pt ID: #Test0056
A
Img Nbr: 17
Slice Loc: 45.0
MRI BRAIN W/ + W/O CONTRAST
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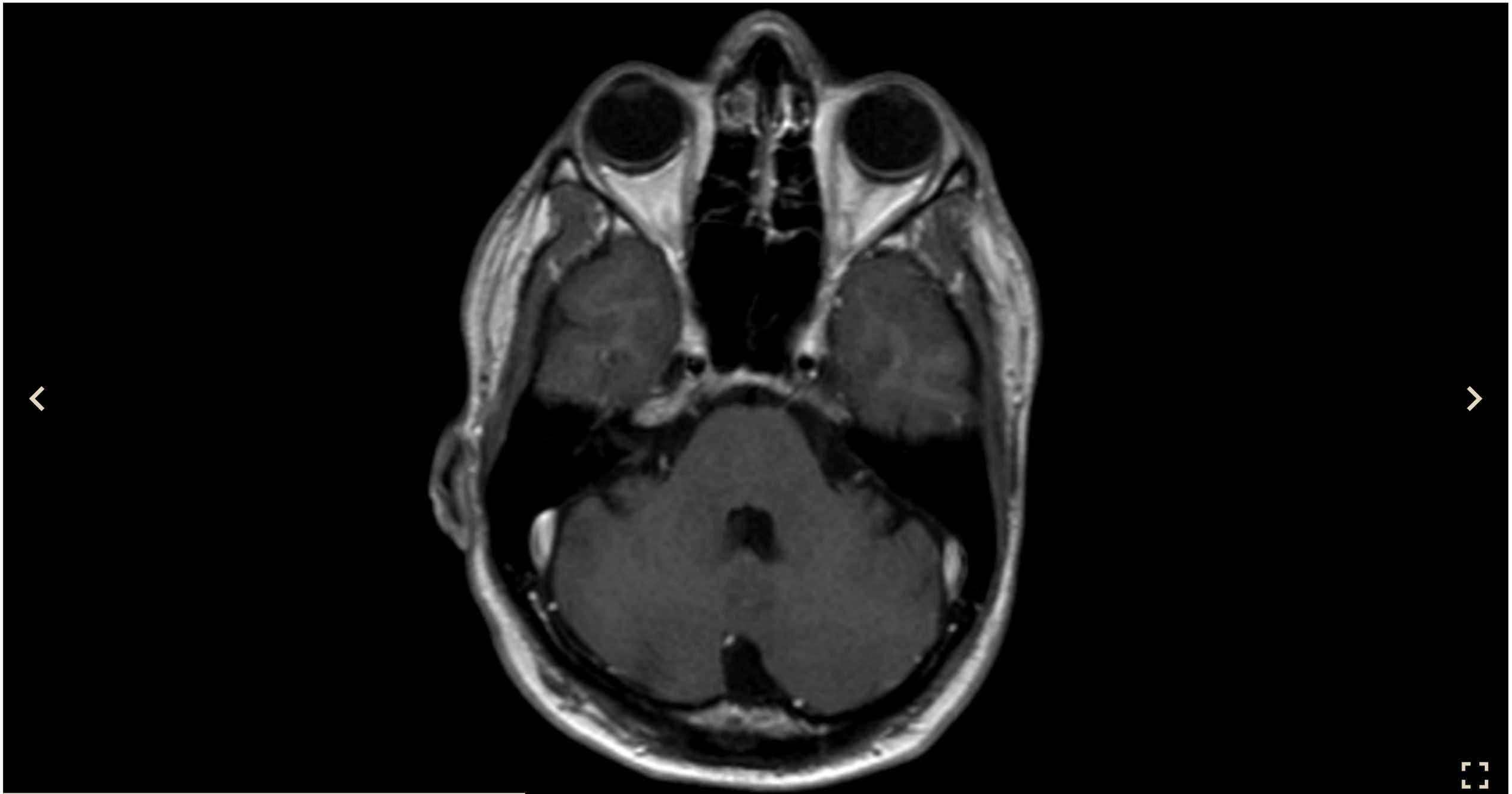

WE NEED TO

LIMIT

THE GOAL FOR EACH STEP

WE NEED TO

LIMIT

THE GOAL FOR EACH STEP

WORK ON SMALL TESTABLE UNITS

SKETCH OUT HIGH LEVEL REQUIREMENTS

SKETCH OUT HIGH LEVEL REQUIREMENTS

DEVELOP A PROTOTYPE

SKETCH OUT HIGH LEVEL REQUIREMENTS

DEVELOP A PROTOTYPE

EVALUATE RESULTS

SKETCH OUT HIGH LEVEL REQUIREMENTS

DEVELOP A PROTOTYPE

EVALUATE RESULTS

IS IT AWFUL?

SKETCH OUT HIGH LEVEL REQUIREMENTS

DEVELOP A PROTOTYPE

EVALUATE RESULTS

IS IT AWFUL?

TEST IT

SKETCH OUT HIGH LEVEL REQUIREMENTS

DEVELOP A PROTOTYPE

EVALUATE RESULTS

IS IT AWFUL?

TEST IT

DECIDE THE NEXT BUILDING BLOCK

HIGH LEVEL REQUIREMENTS

HIGH LEVEL REQUIREMENTS

VIEW AN IMAGE

HIGH LEVEL REQUIREMENTS

VIEW AN IMAGE

SIMPLE

✓

TURNS OUT THIS IS KINDA

DIFFICULT

BECAUSE OF THE

DATA

INVOLVED

MEGABYTES PER IMAGE

MEGABYTES PER IMAGE

HUNDREDS OF MEGABYTES PER STACK

MEGABYTES PER IMAGE

HUNDREDS OF MEGABYTES PER STACK

GIGABYTES PER STUDY

MEGABYTES PER IMAGE

HUNDREDS OF MEGABYTES PER STACK

GIGABYTES PER STUDY

COMPRESSION CODECS

MEGABYTES PER IMAGE

HUNDREDS OF MEGABYTES PER STACK

GIGABYTES PER STUDY

COMPRESSION CODECS

IMAGE TRANSFORMATIONS

MEGABYTES PER IMAGE

HUNDREDS OF MEGABYTES PER STACK

GIGABYTES PER STUDY

COMPRESSION CODECS

IMAGE TRANSFORMATIONS

BLAH BLAH BLAH

LET'S JUST RENDER

ONE

IMAGE

NOT THE NORMALIZED DATA MODEL

NOT THE NORMALIZED DATA MODEL

UNCOMPRESSED

NOT THE NORMALIZED DATA MODEL

UNCOMPRESSED

NO TRANSFORMATIONS

NOT THE NORMALIZED DATA MODEL

UNCOMPRESSED

NO TRANSFORMATIONS

SIMPLER?

NOT THE NORMALIZED DATA MODEL

UNCOMPRESSED

NO TRANSFORMATIONS

SIMPLER?

MAYBE

ONCE WE CAN DO THAT

ONCE WE CAN DO THAT

ADD ANOTHER BUILDING BLOCK

ONCE WE CAN DO THAT

ADD ANOTHER BUILDING BLOCK

DECOMPRESS IMAGES

ONCE WE CAN DO THAT

ADD ANOTHER BUILDING BLOCK

DECOMPRESS IMAGES

APPLY TRANSFORMATIONS

ONCE WE CAN DO THAT

ADD ANOTHER BUILDING BLOCK

DECOMPRESS IMAGES

APPLY TRANSFORMATIONS

ADD ANNOTATIONS

ONCE WE CAN DO THAT

ADD ANOTHER BUILDING BLOCK

DECOMPRESS IMAGES

APPLY TRANSFORMATIONS

ADD ANNOTATIONS

ADD MEASUREMENTS

ONCE WE CAN DO THAT

ADD ANOTHER BUILDING BLOCK

DECOMPRESS IMAGES

APPLY TRANSFORMATIONS

ADD ANNOTATIONS

ADD MEASUREMENTS

ADD FILTERS

ONE

AT A TIME

NOW WE NEED TO

TEST

THE BUILDING BLOCKS AS WE GO

LET'S AUTOMATE

EVERYTHING!

TURNS OUT THIS IS ALSO KINDA

DIFFICULT

BREAK DOWN TESTS INTO

BREAK DOWN TESTS INTO

REUSABLE

STEPS

BREAK DOWN TESTS INTO

REUSABLE

STEPS

ARE YOU NOTICING A THEME?

LOAD APPLICATION

LOAD APPLICATION
PERFORM LOGIN

LOAD APPLICATION
PERFORM LOGIN
LOAD A SINGLE IMAGE

LOAD APPLICATION
PERFORM LOGIN
LOAD A SINGLE IMAGE
MOVE THE MOUSE

LOAD APPLICATION
PERFORM LOGIN
LOAD A SINGLE IMAGE
MOVE THE MOUSE
GET COFFEE

LOAD APPLICATION
PERFORM LOGIN
LOAD A SINGLE IMAGE
MOVE THE MOUSE
GET COFFEE
SIMPLE
✓

WHAT IF WE DON'T KNOW

ANYTHING

ABOUT AUTOMATED TESTING FRAMEWORKS OR CODING?

WHAT IF WE DON'T KNOW

ANYTHING

ABOUT AUTOMATED TESTING FRAMEWORKS OR CODING?

(THIS WAS ACTUALLY THE CASE)

WHAT IF WE DON'T KNOW

ANYTHING

ABOUT AUTOMATED TESTING FRAMEWORKS OR CODING?

(THIS WAS ACTUALLY THE CASE)

MAKE TESTS (AND CODE!) AS SIMPLE AND READABLE AS POSSIBLE

WHAT IF WE DON'T KNOW

ANYTHING

ABOUT AUTOMATED TESTING FRAMEWORKS OR CODING?

(THIS WAS ACTUALLY THE CASE)

MAKE TESTS (AND CODE!) AS SIMPLE AND READABLE AS POSSIBLE

DEVELOP BUILDING BLOCKS!

Anatomy of an automated test

```
1. "use strict";
2.
3. //= require support/ion_client
4. //= require orion/test_harness
5. describe('Test Harness', function () {
6.   it('check patientSelectedHandlerWithMetadata function call', function () {
7.     var event = new CustomEvent(ionClient.messaging.clientMessageEvent, {
8.       detail: {
```

boy this looks human readable

Require some things

```
1. "use strict";
2.
3. //= require support/ion_client
4. //= require orion/test_harness
5. describe('Test Harness', function () {
6.   it('check patientSelectedHandlerWithMetadata function call', function () {
7.     var event = new CustomEvent(ionClient.messaging.clientMessageEvent, {
8.       detail: {
9.         message: {
10.          messageType: 'patientContextChanged',
11.          metaData: {
```

what are all these neat symbols

Describe our test

```
1. "use strict";
2.
3. //= require support/ion_client
4. //= require orion/test_harness
5. describe('Test Harness', function () {
6.   it('check patientSelectedHandlerWithMetadata function call', function () {
7.     var event = new CustomEvent(ionClient.messaging.clientMessageEvent, {
8.       detail: {
9.         message: {
10.          messageType: 'patientContextChanged',
11.          metaData: {
12.            patientId: '123',
13.            encounterId: '456'
```

super descriptive

Run an 'it'

```
1. 'use strict';
2.
3. //= require support/ion_client
4. //= require orion/test_harness
5. describe('Test Harness', function () {
6.   it('check patientSelectedHandlerWithMetadata function call', function () {
7.     var event = new CustomEvent(ionClient.messaging.clientMessageEvent, {
8.       detail: {
9.         message: {
10.          messageType: 'patientContextChanged',
11.          metaData: {
12.            patientId: '123',
13.            encounterId: '456',
14.            venue: 'Inpatient'
15.          },
16.          success: false
17.        }
18.      },
19.      bubbles: true,
20.      cancelable: true
21.    });
22.    spyOn(orionTestHarness, 'patientContextChanged');
23.    document.dispatchEvent(event);
24.
expect(orionTestHarness.patientContextChanged).toHaveBeenCalledWith(event.detail.me
ssage.metaData.patientId, event.detail.message.metaData.encounterId,
```

what exactly is an it?

READING CODE OFTEN ISN'T

FUN

OR EVEN STRAIGHT FORWARD

READING CODE OFTEN ISN'T

FUN

OR EVEN STRAIGHT FORWARD

ESPECIALLY IF WE DON'T HAVE A SHARED NOMENCLATURE

> “It's possible to name everything and to destroy the world.”

- Kathy Acker

WRITE TESTS IN A WAY THAT

REFLECT

OUR IDEAS OF REQUIREMENTS AND TESTING

WRITE TESTS IN A WAY THAT

REFLECT

OUR IDEAS OF REQUIREMENTS AND TESTING

PLAIN DECLARATIVE LANGUAGE

STEP
BY
STEP

LEVERAGE OPEN SOURCE FRAMEWORKS

LEVERAGE OPEN SOURCE FRAMEWORKS

WEBDRIVER.IO

LEVERAGE OPEN SOURCE FRAMEWORKS

WEBDRIVER.IO

WRITE PLUGINS AND EXTENSIONS

LEVERAGE OPEN SOURCE FRAMEWORKS

WEBDRIVER.IO

WRITE PLUGINS AND EXTENSIONS

SHARED NOMENCLATURE

LEVERAGE OPEN SOURCE FRAMEWORKS

WEBDRIVER.IO

WRITE PLUGINS AND EXTENSIONS

SHARED NOMENCLATURE

ALLOWS CONTRIBUTORS & CONSUMERS TO UNDERSTAND EACH OTHER

Anatomy of an automated test

```
1. "use strict";
2.
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
9.0.json'));
6. VerticalRegression(function () {
```

part deux

Load our test data

```
1. "use strict";
2.
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
9.0.json'));
6. VerticalRegression(function () {
7.   Epic("IMGVIEWER-15");
8.   Story("IMGVIEWER-24");
9.   Requirements('1497453',
'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
10.   Requirements('1497457',
```

ignore the wild random numbers

Describe the kind of test

```
1. "use strict";
2.
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
9.0.json'));
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8.   Story("IMGVIEWER-24");
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'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_ubk58EEIEem5Lbs4CCemtg');
```

Vertical Regression, UI, Hazard, White Box?

Link our Epic!

```
1. "use strict";
2.
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
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10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
```

Link some Stories

```
1. "use strict";
2.
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
9.0.json'));
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'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
```

jira is pretty neat

Even link our requirements

```
1. "use strict";
2.
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
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7.   Epic("IMGVIEWER-15");
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'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
```

yes that is linked to DNG

Provide our test description

```
3. // Image Viewer-VR-Retrieve and Load.test-spec.js
4. // XA Cardiac Cath
5. var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
9.0.json'));
6. VerticalRegression(function () {
7.   Epic("IMGVIEWER-15");
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10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
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14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
```

Perform test steps

```
var studyA =
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.659.0.json'));
VerticalRegression(function () {
  Epic("IMGVIEWER-15");
  Story("IMGVIEWER-24");
  Requirements('1497453', 'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
  Requirements('1497457', 'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
  Requirements('1497461', 'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
  Requirements('1497459', 'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
  Description("Purpose: Test basic retrieval and load of images Prequisites: 1. Access to Image Viewer 2. Test data available in whichever environment the tests are being run Study A: ".concat(studyA.toString()));
  Step("Load Application & Log In", function () {
    ExpectedResult("User is logged in and application is loaded");
    loadApplication();
  });
  Step("Load Study A and Load Series", function () {
    ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is loaded"));
    var seriesInstanceUID = studyA.seriesInstanceUID[0];
    loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
    loadSeries(seriesInstanceUID);
    waitForSeriesToCache(seriesInstanceUID);
```

Specify our expected result

```
Study(require('@studies/1.3.6.1.4.1.5962.99.1.1267762035.376104425.1556045955955.65
9.0.json'));
  6. VerticalRegression(function () {
  7.   Epic("IMGVIEWER-15");
  8.   Story("IMGVIEWER-24");
  9.   Requirements('1497453',
'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
 10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
 11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
 12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
 13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
 14.   Step("Load Application & Log In", function () {
 15.     ExpectedResult("User is logged in and application is loaded");
 16.     loadApplication();
 17.   });
 18.   Step("Load Study A and Load Series", function () {
 19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
 20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
 21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
 22.     loadSeries(seriesInstanceUID);
 23.     waitForSeriesToCache(seriesInstanceUID);
 24.     hideCineControl(seriesInstanceUID);
```

Call our helper method

```
9.0.json'));
 6. VerticalRegression(function () {
 7.   Epic("IMGVIEWER-15");
 8.   Story("IMGVIEWER-24");
 9.   Requirements('1497453',
'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
22.     loadSeries(seriesInstanceUID);
23.     waitForSeriesToCache(seriesInstanceUID);
24.     hideCineControl(seriesInstanceUID);
25.     checkViewport(seriesInstanceUID);
```

Perform the next step

```
 7.   Epic("IMGVIEWER-15");
 8.   Story("IMGVIEWER-24");
 9.   Requirements('1497453',
'https://jazz.cerner.com:9443/rm/resources/_[illegible]Lbs4CCemtg');
10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
22.     loadSeries(seriesInstanceUID);
23.     waitForSeriesToCache(seriesInstanceUID);
24.     hideCineControl(seriesInstanceUID);
25.     checkViewport(seriesInstanceUID);
26.   });
27. });
```

Specify our expected result

```
 9.   Requirements('1497453',
'https://jazz.cerner.com:9443/rm/resources/_Cak6IEEIEem5Lbs4CCemtg');
10.   Requirements('1497[illegible]',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
22.     loadSeries(seriesInstanceUID);
23.     waitForSeriesToCache(seriesInstanceUID);
24.     hideCineControl(seriesInstanceUID);
25.     checkViewport(seriesInstanceUID);
26.   });
27. });
```

Load some data

```
https://jazz.cerner.com:9443/rm/resources/_cakUIEIEem5Lbs4CCemtg');
10.   Requirements('1497457',
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
22.     loadSeries(seriesInstanceUID);
23.     waitForSeriesToCache(seriesInstanceUID);
24.     hideCineControl(seriesInstanceUID);
25.     checkViewport(seriesInstanceUID);
26.   });
27. });
```

Load some more specific data

```
'https://jazz.cerner.com:9443/rm/resources/_cojC4EEIEem5Lbs4CCemtg');
 11.    Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhb58EEIEem5Lbs4CCemtg');
 12.    Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_nErqkEEIEem5Lbs4CCemtg');
 13.    Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
 14.    Step("Load Application & Log In", function () {
 15.      ExpectedResult("User is logged in and application is loaded");
 16.      loadApplication();
 17.    });
 18.    Step("Load Study A and Load Series", function () {
 19.      ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
 20.      var seriesInstanceUID = studyA.seriesInstanceUID[0];
 21.      loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
 22.      loadSeries(seriesInstanceUID);
 23.      waitForSeriesToCache(seriesInstanceUID);
 24.      hideCineControl(seriesInstanceUID);
 25.      checkViewport(seriesInstanceUID);
 26.    });
 27. });
```

Wait for the data to process

```
11.   Requirements('1497461',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
12.   Requirements('1497459',
'https://jazz.cerner.com:9443/rm/resources/_uhk58EEIEem5Lbs4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
22.     loadSeries(seriesInstanceUID);
23.     waitForSeriesToCache(seriesInstanceUID);
24.     hideCineControl(seriesInstanceUID);
25.     checkViewport(seriesInstanceUID);
26.   });
27. });
```

Capture test evidence

```
12.   Requirements('1497459',
'https://jazz.cerner.com:443/rm/resources/_nEIqkEEIEem5Ib4CCemtg');
13.   Description("Purpose: Test basic retrieval and load of images Prequisites:
1. Access to Image Viewer 2. Test data available in whichever environment the tests
are being run Study A: ".concat(studyA.toString()));
14.   Step("Load Application & Log In", function () {
15.     ExpectedResult("User is logged in and application is loaded");
16.     loadApplication();
17.   });
18.   Step("Load Study A and Load Series", function () {
19.     ExpectedResult("\n    Study A ".concat(studyA.studyDescription, " is
loaded"));
20.     var seriesInstanceUID = studyA.seriesInstanceUID[0];
21.     loadStudy(studyA.studyInstanceUID, studyA.numberOfStacks);
22.     loadSeries(seriesInstanceUID);
23.     waitForSeriesToCache(seriesInstanceUID);
24.     hideCineControl(seriesInstanceUID);
25.     checkViewport(seriesInstanceUID);
26.   });
27. });
```

profit!

TEST HELPER METHODS ARE OUR BUILDING BLOCKS

TEST HELPER METHODS ARE OUR BUILDING BLOCKS

LOAD A STUDY

TEST HELPER METHODS ARE OUR BUILDING BLOCKS

LOAD A STUDY

LOAD A SERIES

TEST HELPER METHODS ARE OUR BUILDING BLOCKS

LOAD A STUDY

LOAD A SERIES

DO SOME SPECIFIC INTERACTION

TEST HELPER METHODS ARE OUR BUILDING BLOCKS

LOAD A STUDY

LOAD A SERIES

DO SOME SPECIFIC INTERACTION

ONCE EACH COMPONENT IS IMPLEMENTED, WE CAN STRING THEM TOGETHER FOR MORE COMPLEX WORKFLOWS

TEST HELPER METHODS ARE OUR BUILDING BLOCKS

LOAD A STUDY

LOAD A SERIES

DO SOME SPECIFIC INTERACTION

ONCE EACH COMPONENT IS IMPLEMENTED, WE CAN STRING THEM TOGETHER FOR MORE COMPLEX WORKFLOWS

SIMPLE

✓

DEV WORKFLOW

DEV WORKFLOW

WRITE BASIC REQUIREMENT

DEV WORKFLOW

WRITE BASIC REQUIREMENT

CAN WE USE OTHER REQUIREMENTS AS BUILDING BLOCKS?

DEV WORKFLOW

WRITE BASIC REQUIREMENT

CAN WE USE OTHER REQUIREMENTS AS BUILDING BLOCKS?

DESIGN & DERIVE THE TESTABLE COMPONENT

DEV WORKFLOW

WRITE BASIC REQUIREMENT

CAN WE USE OTHER REQUIREMENTS AS BUILDING BLOCKS?

DESIGN & DERIVE THE TESTABLE COMPONENT

CAN WE USE OTHER COMPONENTS AS BUILDING BLOCKS?

DEV WORKFLOW

WRITE BASIC REQUIREMENT

CAN WE USE OTHER REQUIREMENTS AS BUILDING BLOCKS?

DESIGN & DERIVE THE TESTABLE COMPONENT

CAN WE USE OTHER COMPONENTS AS BUILDING BLOCKS?

IMPLEMENT THE COMPONENT

IMPLEMENT THE TEST

IMPLEMENT THE TEST

REMEMBER TO USE OUR OTHER TEST HELPERS

IMPLEMENT THE TEST

REMEMBER TO USE OUR OTHER TEST HELPERS

ADD TEST TO ONGOING SUITE

IMPLEMENT THE TEST

REMEMBER TO USE OUR OTHER TEST HELPERS

ADD TEST TO ONGOING SUITE

RUN ALL THE TESTS ALL THE TIME

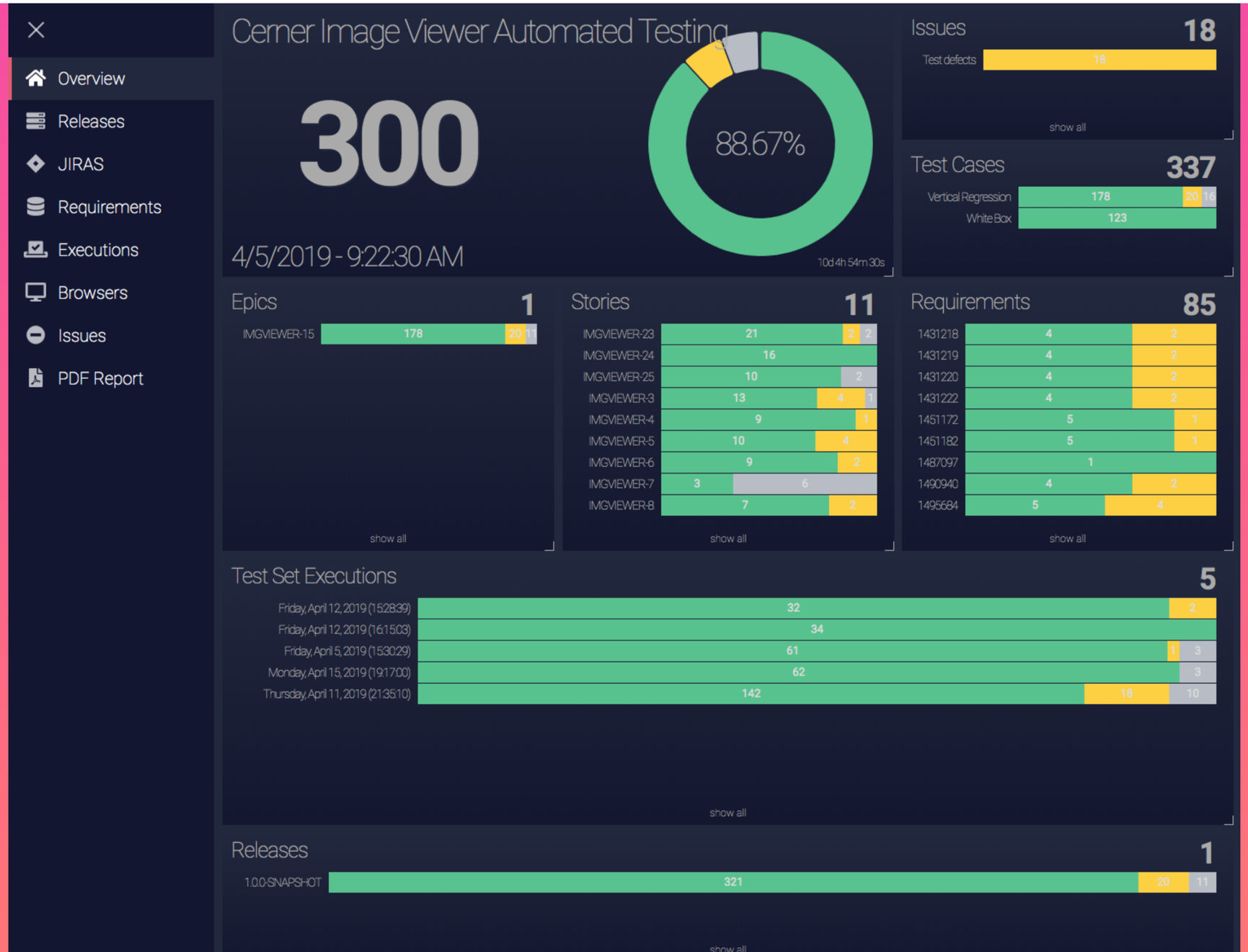
IMPLEMENT THE TEST

REMEMBER TO USE OUR OTHER TEST HELPERS

ADD TEST TO ONGOING SUITE

RUN ALL THE TESTS ALL THE TIME

MONITOR TEST OUTPUT


Overview
Releases
JIRAS
Requirements
Executions
Browsers
Issues
PDF Report
Cerner Image Viewer Automated Testing
300
88.67%
4/5/2019 - 9:22:30 AM
10d 4h 54m 30s
Issues 18
Test defects 18
show all
Test Cases 337
Vertical Regression 178 20 16
White Box 123
Epics 1
IMGVIEWER-15 178 20 11
show all
Stories 11
IMGVIEWER-23 21 2 2
IMGVIEWER-24 16
IMGVIEWER-25 10 2
IMGVIEWER-3 13 4 1
IMGVIEWER-4 9 1
IMGVIEWER-5 10 4
IMGVIEWER-6 9 2
IMGVIEWER-7 3 6
IMGVIEWER-8 7 2
show all
Requirements 85
1431218 4 2
1431219 4 2
1431220 4 2
1431222 4 2
1451172 5 1
1451182 5 1
1487097 1
1490940 4 2
1495684 5 4
show all
Test Set Executions 5
Friday, April 12, 2019 (15:28:39) 32 2
Friday, April 12, 2019 (16:15:03) 34
Friday, April 5, 2019 (15:30:29) 61 1 3
Monday, April 15, 2019 (19:17:00) 62 3
Thursday, April 11, 2019 (21:35:10) 142 18 10
show all
Releases 1
1.0.0-SNAPSHOT 321 20 11
show all

Overview
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JIRAS
Requirements
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PDF Report

Releases
- 1.0.0-SNAPSHOT
  - IMGVIEWER-15
    - IMGVIEWER-1
    - IMGVIEWER-25
      - Engineering
        - Vertical Regression
          - Image Viewer-W
          - Image Viewer-V
          - Image Viewer-V
          - Image Viewer-W
          - Image Viewer-W
          - Image Viewer-W
          - Image Viewer-V
          - Image Viewer-V
          - Image Viewer-W
          - Image Viewer-V
          - Image Viewer-W
          - Image Viewer-V
  - IMGVIEWER-3
    - Engineering
      - Vertical Regression
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V
        - Image Viewer-V

Image Viewer-VR-Window Level - IMGVIEWER-15 - IMGVIEWER-5

Overview | History

4/15/2019 1:13:22 PM 18m 16s 179ms

Requirements

1430545, 1430546, 1430547, 1430548, 1430549, 1430550, 1430551, 1430552, 1430553, 1430554, 1430555, 1495684

Epics & Stories

IMGVIEWER-15, IMGVIEWER-5

Description

```
Purpose: Test window level capabilities and consistencies across different bit depths and LUTs
Prequisites:
  1. Access to Image Viewer
  2. Test data available in whichever environment the tests are being run
     Study A:
      Study Instance UID: 1.2.276.0.7230010.3.200.6
      Study Description: COMBINED, LUT
      Patient ID: XLUT_PNN
      Patient Name: COMBINED LUT PState TEST
      Series Instance UIDs: 1.2.276.0.7230010.3.200.6.2, 1.2.276.0.7230010.3.200.6.3
```

Parameters

Executor: root
OS: Linux 3.10
Selenium Environment: DOCKER
Version: 1.0.0-SNAPSHOT
browser: chrome
os platform: linux
os version: 3.10.0-957.1.3.el7.x86_64

Test Steps (127)

- 1. Load Application & Log In — 871ms
  Expected Result •••
- 2. Validate tooltip — 46ms
  Expected Result •••
- 3. Validate icon — 1s 95ms
  Screenshots
  Expected Result •••
- 4. Load Study A — 5s 969ms
  Expected Result •••
- 5. Load XLUT_02 — 12s 342ms
  Screenshots
  Expected Result •••
- 6. Validate Cursor — 47ms
  Expected Result •••
- 7. Validate shortcut key access — 1s 657ms
  Expected Result •••
- 8. Validate Context Menu Access — 4s 234ms
  Screenshots
  Expected Result •••
- 9. Widen Window & Lower Center — 7s 346ms

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Releases
1.0.0-SNAPSHOT
IMGVIEWER-15
IMGVIEWER-1
IMGVIEWER-25
Engineering
Vertical Regression
Image Viewer-W
Image Viewer-V
Image Viewer-V
Image Viewer-W
Image Viewer-W
Image Viewer-W
Image Viewer-V
Image Viewer-V
Image Viewer-W
Image Viewer-V
Image Viewer-W
Image Viewer-V
IMGVIEWER-3
Engineering
Vertical Regression
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V
Image Viewer-V

5. Load XLUT_02

Overview History

4/15/2019 1:13:22 PM 18m 16s 179ms

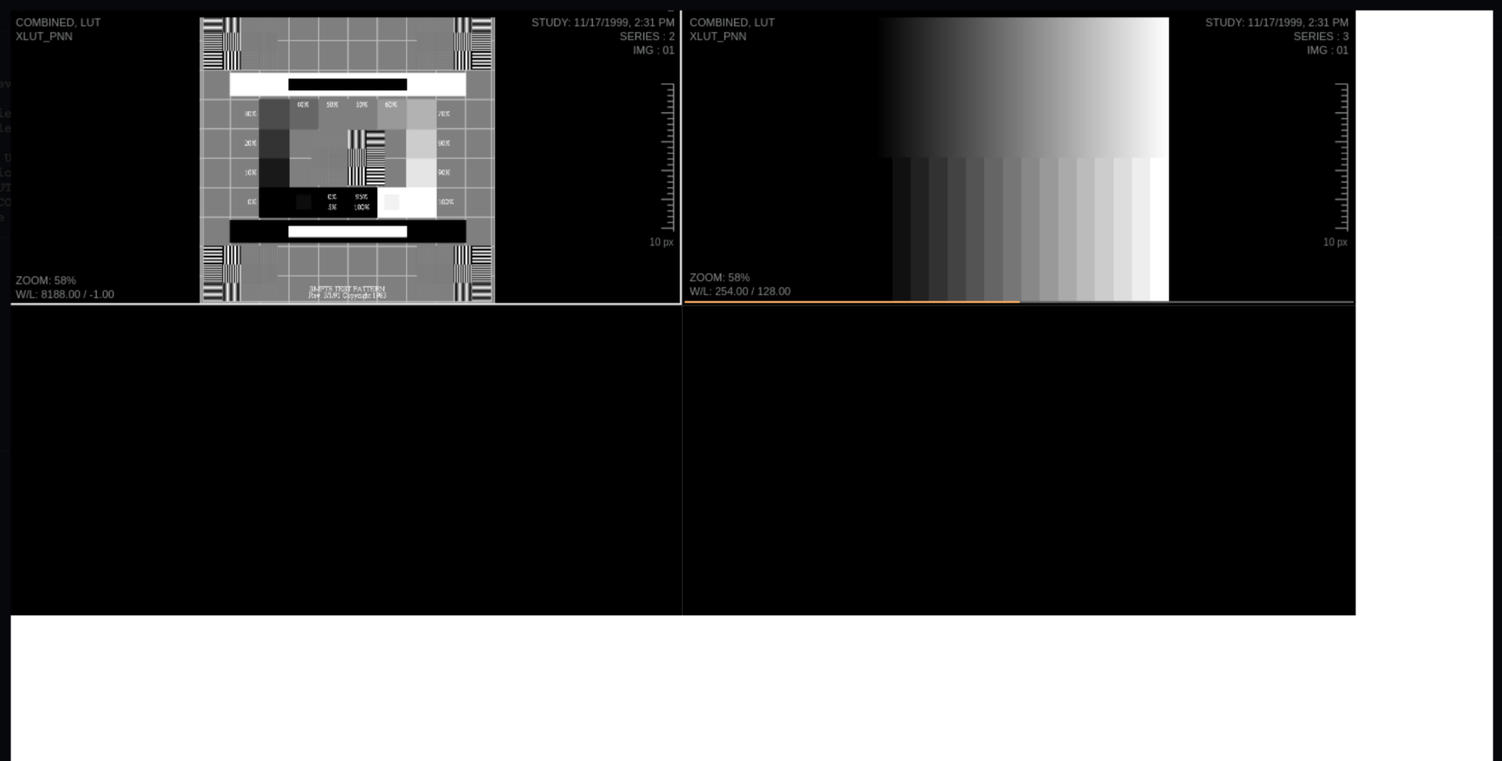
Requirements
1430545, 1430546, 1430547, 1430548, 1430549, 1430550, 1430551, 1430552, 1430553, 1430554, 1430555, 1495684

Epics & Stories
IMGVIEWER-15, IMGVIEWER-5

Description
Purpose: Test window lev
Prequisites:
1. Access to Image Vie
2. Test data available
Study A:
Study Instance U
Study Descriptio
Patient ID: XLUT
Patient Name: CO
Series Instance

Parameters
Executor: root
OS: Linux 3.10
Selenium Environment: DOCKER
Version: 1.0.0-SNAPSHOT
browser: chrome
os platform: linux
os version: 3.10.0-957.1.3.el7.x86_64

Test Steps (127)
1. Load Application & Log In
Expected Result
2. Validate tooltip
Expected Result
3. Validate icon
Screenshots
Expected Result
4. Load Study A
Expected Result
5. Load XLUT_02
Screenshots
Expected Result
6. Validate Cursor
Expected Result
7. Validate shortcut key access
Expected Result
8. Validate Context Menu Access
Screenshots
Expected Result
9. Widen Window & Lower Center



Viewer

STUDY LIST

TOOLBAR

BRAIN SELLA
1/8/2001

SAG T-1
13 2

COR T-1
17 3

COR FSE T2
18 4

COR FLAIR
11 5

AXIAL FSE T2
13 6

COR T-1 POST GAD
13 7

SAG T-1 POST GAD
15 8

3-PLANE LOC
6 17

3-PLANE LOC
9 18

3-PLANE LOC

VIEWER, IMAGE
#IMGVIEWER
ACQUISITION: 1/8/2001, 6:03 PM
SERIES : 2
IMG : 1
H
A
F
10 mm
ZOOM: 111%
W/L: 1224.00 / 612.00

VIEWER, IMAGE
#IMGVIEWER
ACQUISITION: 1/8/2001, 6:11 PM
SERIES : 3
IMG : 1
H
R
L
F
10 mm
ZOOM: 111%
W/L: 1558.00 / 779.00

VIEWER, IMAGE
#IMGVIEWER
ACQUISITION: 1/8/2001, 6:17 PM
SERIES : 4
IMG : 1
H
R
L
F
10 mm
ZOOM: 111%
W/L: 1213.00 / 606.00

VIEWER, IMAGE
#IMGVIEWER
ACQUISITION: 1/8/2001, 6:22 PM
SERIES : 5
IMG : 1
H
R
L
F
10 mm
ZOOM: 111%
W/L: 672.00 / 336.00

ANY

QUESTIONS

COMMENTS, CONCERNS, GENERAL CRITICISMS

?

PLEASE LEAVE

FEEDBACK

JUAN.NARVAEZ@CERNER.COM

HTTPS://JDNARVAEZ.GITHUB.IO/MODERNIZING-A-MONOLITH

HTTPS://GITHUB.COM/JDNARVAEZ/MODERNIZING-A-MONOLITH

MADE WITH REACT, @VX, AND SPECTACLE